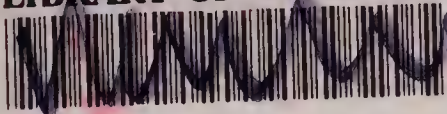


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Fig. 1



Fig. 2.



United States Rifle, Model of 1903.

How to Shoot The United States Rifle —AND— How to Care For It

By
CAPTAIN GEORGE T. BOWMAN
6th Cavalry, United States Army

1914

Franklin Hudson Publishing Company
Kansas City, Mo.

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INTRODUCTORY.

To a country which no longer has the right to claim that it is a "Nation of Marksmen," the trained rifle shot is a valued asset. In the olden days the rifle hung on the wall of every home and the men knew how to use it. To-day the people of the United States are awakening to the fact that the young men of the present generation should learn in time of peace how to handle and shoot the modern rifle if these men are to be of assistance to their country as defenders in time of war.

A course of instruction in shooting is one which trains the eye, steadies the nerves and encourages alertness and decision. No man can shoot who is intemperate in his habits. The natural desire of most young men to shoot well and the liking of competition with their fellows result in an inclination toward temperate and regular living which is surely much to be wished for and is of inestimable advantage to any man.

This little book is not intended to replace any work on the subject of rifles and shooting. It merely puts into a readable, convenient and practical form the information which the beginner needs to know, whether he be the regular soldier, sailor or marine, National Guardsman, volunteer, college student, schoolboy or other novice.

It places in one small book the vitally important information which otherwise must be culled from hundreds of pages of The Description and Rules for the Management of the United States Rifle, The Small Arms Firing Manual, The Drill Regulations, The United States Army Regulations, The Target Range Pocket Book (from all of which extracts have been made), and the numerous books on rifle shooting, and in addition makes suggestions to the beginner which are the result of many years of rifle shooting and coaching.

It also furnishes the instructor with a system of instruction without the necessity of searching through many books which contain much that he has not the time, the opportunity nor the desire to digest.

I have never commenced a season's instruction of men on the subject of the rifle and shooting but that I

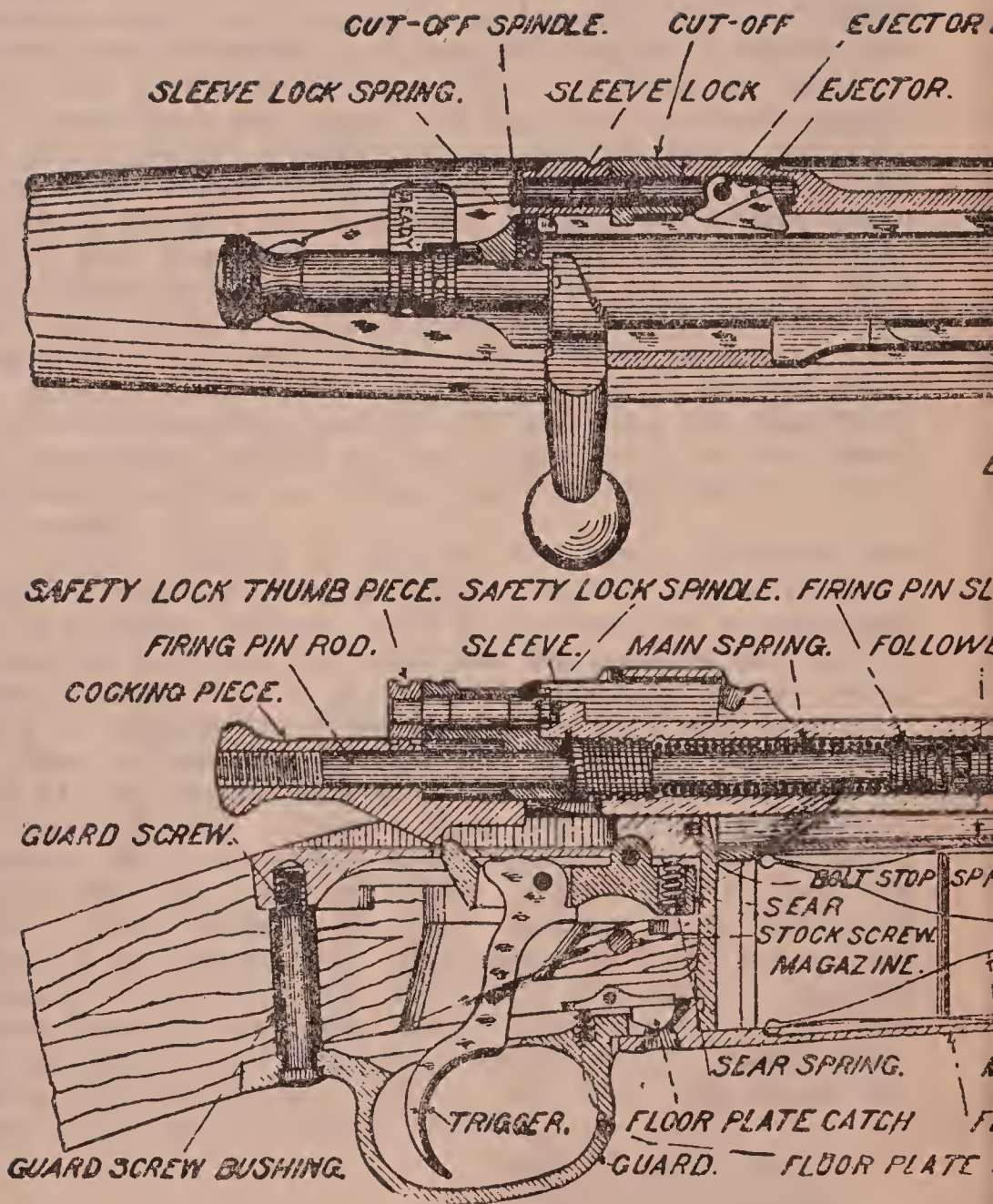
have had to go through many books and other publications, making notes of vital points to be brought to the attention of the men, arranging a systematic course of instruction which would be valuable, progressive, and not too long.

I have time and again felt the need of some reasonably brief printed instructions, a copy of which could be put into the hands of every man, telling him, "You study and think about what this little book says; it will teach you all that you need to know to start you on the right road to high-class shooting; it will tell you how to clean your rifle and how to take care of it; it will tell you the names of those parts which it is most important that you should know; it will tell you what to do and what to avoid in shooting, and it will give you the benefit of the experience gained on the range by men who have practiced shooting for a long time and who know whereof they speak."

Target shooting is one of the best of sports for healthy, vigorous men, and the shooting of the present-day high-power military rifle is no task for a weakling. It requires a strong man who has his muscles and nerves under control. It is a clean out-of-doors game which tends to improve its devotee both in mind and body.

Take a look at the hundreds of young men assembled at any one of the great rifle competitions, men of all walks in life, shooters from the civilian rifle clubs, business and professional men, soldiers from the National Guard, the Army and the Navy. What kind of men are they? Good, strong, energetic fellows, well developed mentally and physically. They must lead the simple life in order to be in fit condition, and the outdoor exercise keeps them in excellent health and spirits. You will find no hollow-eyed dyspeptics among them. Keen, alert, quick, fair and square must be the man who would engage in the royal sport of shooting.

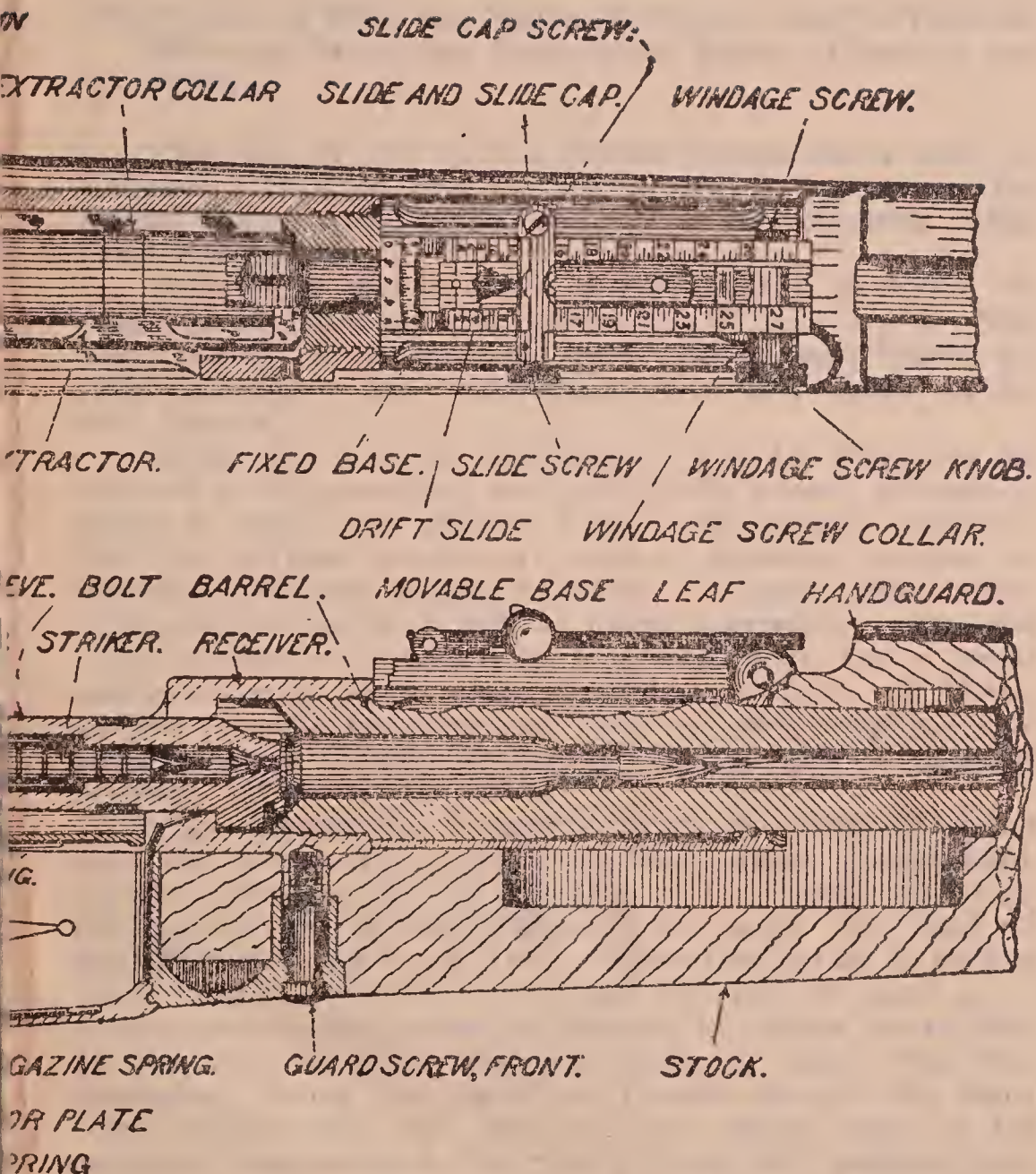
GEO. T. BOWMAN,
Captain 6th Cavalry,
United States Army.



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Figs.

United States P



and 4.
 le, Model of 1903.

CHAPTER ONE.

Description of Rifle and Names of Parts.—How to Take the Bolt and Magazine Mechanism Apart.—Cleaning and Oiling.

The rifle in use by the United States Army and the National Guard of the various States is known as the United States Rifle, Model of 1903. It is commonly called "The Springfield."

Each man should have a rifle issued to him. He only should fire that rifle, clean it and care for it. The best results can be obtained only when a man knows his rifle thoroughly and understands just how much to expect from it.

When the rifle is received, it will be found to be covered with cosmoline, and this thick greasy substance, which is inside and outside, must be thoroughly removed. For this purpose provide a bottle of gasoline, benzine or kerosene oil and plenty of rags. A small pine stick, sharpened at one end, will be found necessary to get into little corners and holes; a few toothpicks are a great convenience to have when cleaning. A bottle of Three-in-One oil will be necessary, also a brass cleaning rod, some Canton flannel or outing flannel and a pair of scissors.

After wiping the cosmoline from the surface of the rifle, the bolt is to be removed, taken apart and cleaned. On the left-hand side of the rifle will be found the Cut-off, on one side of which appears the word "On" and on the other side the word "Off." When this cut-off is turned down, the word "Off" shows and the rifle is used as a single loader only, as the bolt cannot be drawn far enough to the rear to allow the cartridges to arise from the magazine. When the cut-off is turned up and the word "On" shows, then the bolt may be pulled back to its rearmost position and the rifle is ready for loading from the magazine. When the cut-off is turned half-way up, the bolt may be drawn out entirely.

A little farther back than the Cut-off will be seen the Safety Lock, on one side of which is the word "Ready" and on the other side the word "Safe." When

this safety lock is turned to the left, it is inoperative; that is, it has no effect on the movement of the bolt, which may be opened or closed as desired. When the piece is cocked, the safety lock may be turned to the right, showing the word "Safe," and the bolt then cannot be moved nor the rifle fired. If the safety lock is turned straight up to a vertical position, the bolt may be operated, but the rifle cannot be fired. The safety lock cannot be turned except when the piece is cocked. The rifle is cocked by raising the bolt handle or by pulling back the cocking piece with the thumb and fingers. Before removing the bolt from the rifle, the piece should be cocked and the safety lock turned straight up.

To Remove the Bolt.—Place the Cut-off at the center notch, cock the arm, turn the safety lock straight up, raise the bolt handle (Fig. 5), and draw out the bolt.

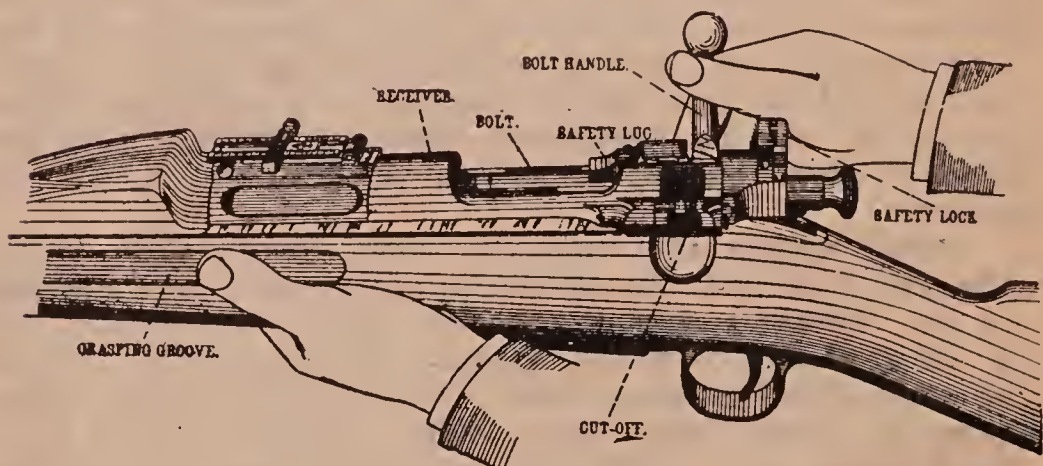


Fig. 5.

Hold the bolt in the left hand, press sleeve lock in with the thumb of right hand to unlock sleeve from bolt and turn sleeve to the left, then take hold of cocking piece with the right hand (Fig. 6), and unscrew sleeve from the bolt by turning to the left.

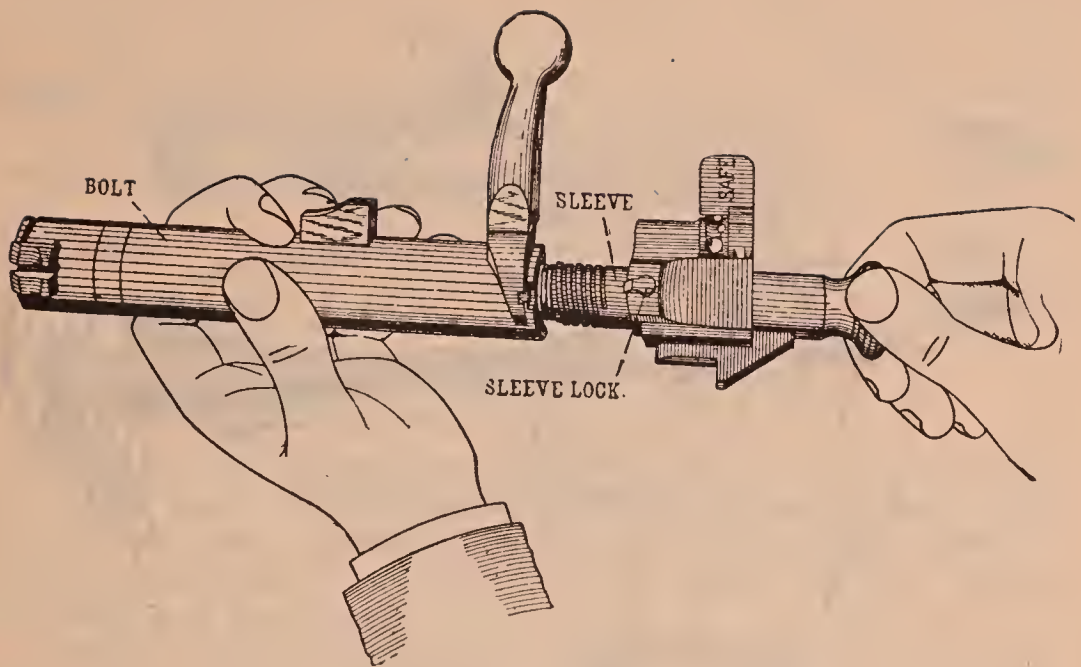


Fig. 6.

Hold the sleeve between forefinger and thumb of the left hand, draw the cocking piece back with the middle finger and thumb of right hand, turn the safety lock down to the left with the forefinger of the right hand, in order to allow the cocking piece to move forward in the sleeve, thus partially relieving the tension of the mainspring.

Place the cocking piece against the breast, draw back the firing pin sleeve with the forefinger and thumb of right hand and hold it in this position (Fig. 7), while removing the striker with the left hand. The striker is merely lifted off the end of the firing pin, and turning the striker is not necessary.

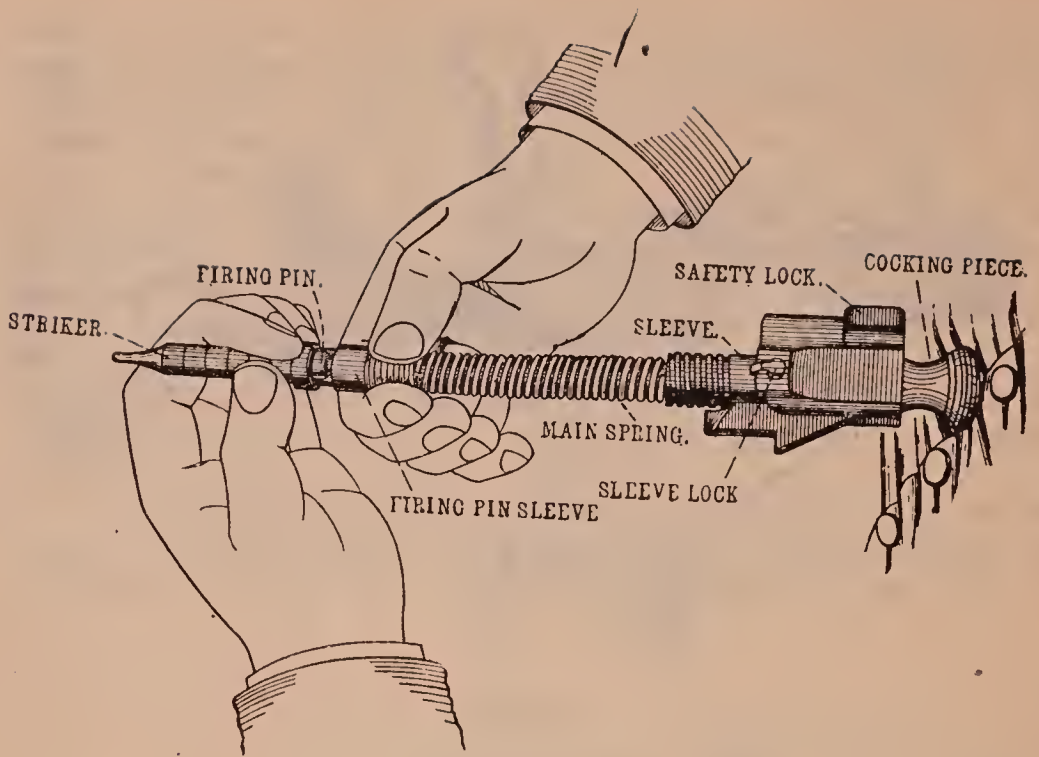


Fig. 7.

It will be noticed that one end of the firing pin sleeve is roughened so that thumb and forefinger may get a good hold upon it.

Remove firing pin sleeve and mainspring from the firing pin and then pull the firing pin out of the sleeve.

To take the extractor from the bolt, turn the extractor to the right, forcing its tongue out of the groove in the front of the bolt, then holding the bolt in the right hand, place the end of the right thumb against the rear end of the extractor (Fig. 8) and force it forward and off the bolt.

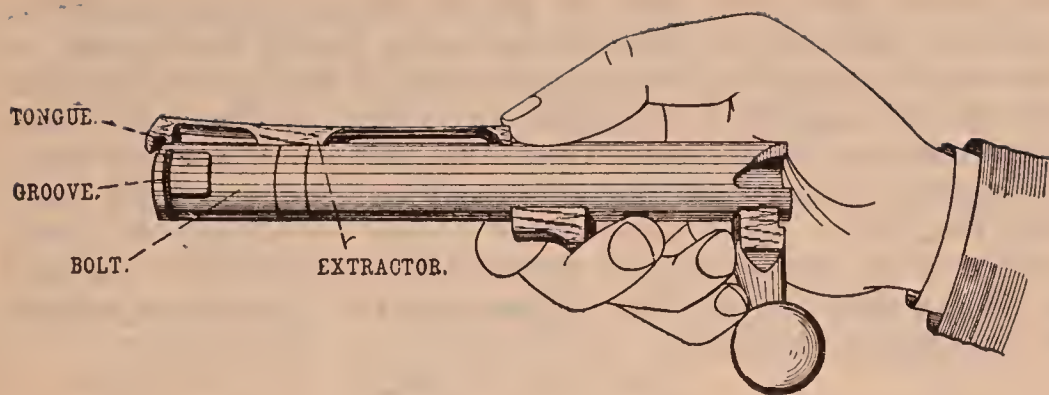


Fig. 8.

Wet a piece of rag with some gasoline and thoroughly clean the parts of the bolt, removing the cosmoline with which they were greased, and then wipe dry. Use a pointed stick or toothpicks to get into all the little openings and crevices.

Apply a light coating of Three-in-One oil to all parts of the bolt mechanism before putting it together. The oil may be applied by rubbing the parts with a piece of cotton cloth upon which a few drops of oil have been placed, or by wetting the finger with oil and rubbing it on the parts. Avoid an excessive use of oil, as it is not only unnecessary and wasteful, but will also result in the parts becoming gummed and sticky, allow dust to stick to the parts, and when the trigger is squeezed the excess oil is very liable to spray out into the eyes of the shooter, which will greatly interfere with the accuracy of his next shot. Always keep the working parts lightly oiled and any part that may appear to move hard can generally be freed by the use of a little oil.

To replace the extractor on the bolt, grasp with the left hand the rear of the bolt, handle up, and turn the extractor collar with the thumb and forefinger of the right hand until its lug is on a line with the safety lug of the bolt; take the extractor in the right hand and insert the lug on the collar into the undercuts in the extractor by pushing the extractor to the rear until its tongue comes in contact with the rim on the face of the bolt. The putting on of the extractor will be found to be quite difficult unless pressure is applied with the left thumb on

the top of the rear part of the extractor, which part is thin and "springy." That pressure is really the secret of the whole operation, and when applied the extractor will slip on quite easily. Turn the extractor to the right until it is over the right lug. Take the bolt in the right hand and press the hook of the extractor against the butt plate (see Fig. 9) or some other rigid object, applying the pressure so that the extractor will be forced upwards as well as backwards, until the tongue on the extractor enters its groove in the bolt.

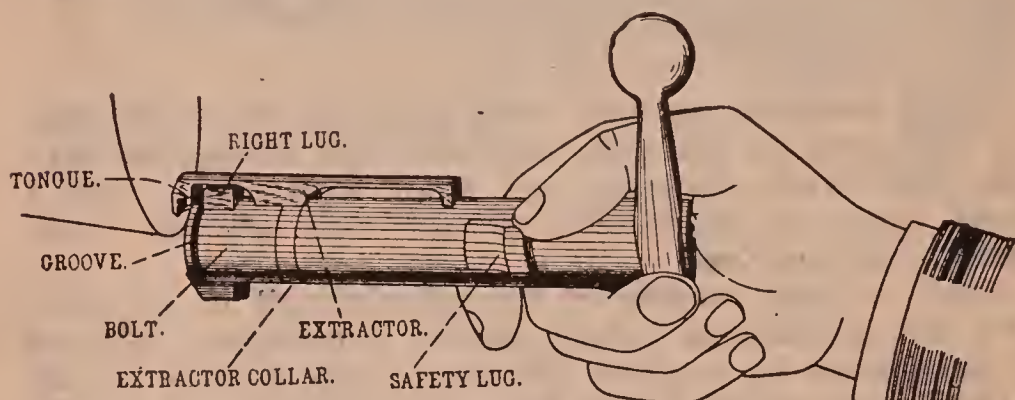


Fig. 9.

After they have been cleaned and oiled, put the firing pin into the sleeve, first turning the safety lock down to the left to permit the firing pin to enter the sleeve as far as possible. Place the cocking piece against the breast, (see Fig. 7), put on the mainspring with the left hand, and then, while holding the mainspring back with the left hand, pick up and put on the firing pin sleeve with the right hand, the roughened end towards the mainspring, pushing strongly towards the body and being careful not to let the spring force the firing pin sleeve off the firing pin, as it may jump some distance away and be lost; pick up the striker with the left hand and place it on the end of the firing pin. Many men at first find it a difficult operation to assemble these parts, but if these instructions are followed in detail, there will be no trouble experienced. Be sure to turn the safety lock down to the left and to hold the spring back strongly.

Holding the sleeve with the right hand, place the point of the striker against some substance which is not

hard enough to injure it (wood is very good) and press down, thus compressing the mainspring and forcing back the cocking piece until the safety lock can be turned to the vertical position with the thumb and fingers of the left hand. While pressing down look for the locking groove on the cocking piece and turn the safety lock at the right moment.

Take the bolt in the left hand and, holding the cocking piece in the right hand, insert the firing pin in the bolt and by turning to the right screw up the sleeve until the sleeve lock enters its notch on the bolt.

Lay the bolt aside until the balance of the rifle is cleaned.

Just in front of the trigger guard will be seen a small hole in the magazine floor plate, through which hole the floor plate catch is visible. With the bullet end of a cartridge, or with a small screwdriver, press on this catch, pressing downwards and backwards; this releases the floor plate and it is then removed from the rifle with the magazine spring and follower attached to it.

Remove the magazine spring from the floor plate by raising the rear end of the first limb of the magazine spring high enough to clear the lug on the floor plate and draw it out of its mortise; proceed in the same manner to remove the follower.

After cleaning, wipe the magazine spring, follower and floor plate with an oiled rag and then replace the follower and floor plate on the magazine spring. Notice that the smaller end of the magazine spring slides into the undercuts on the follower and the larger end fits in the same way into the undercuts in the floor plate.

Lay the magazine spring and the parts attached to it aside until the balance of the rifle is cleaned.

Clean all the cosmoline from the rifle, finishing with the inside of the barrel, which is called the bore.

In cleaning the bore use a brass cleaning rod and patches of outing flannel cloth cut with the scissors into pieces about 2 inches square. If the heavier Canton flannel is used, the patches must be smaller. The exact size will soon be determined by a few trials. If the patches are too small, they will not clean the bore effectively;

while if too large, they are quite liable to become jammed in the bore and cause some trouble before they can be extracted. If a patch becomes wedged in the bore and cannot be moved in either direction, pour some oil down the barrel and let it remain until the piece of cloth is thoroughly soaked. It can then be pushed out easily with the cleaning rod.

Always clean the bore from the breech and never from the muzzle. When cleaning, rest the muzzle on a piece of soft wood, which will prevent injury to the muzzle and keep the grease from the floor.

To make sure that the muzzle is well cleaned use a short round stick of soft wood upon the end of which patches of the cleaning cloth are placed and inserted into the muzzle, pushed back and forth and twisted around a few times. This will insure the cleaning of the muzzle end of the bore, which the cleaning rod may not have reached well enough for perfect cleaning.

Place a small piece of white paper in the lower end of the receiver to reflect the light into the bore of the rifle. Look into the barrel from the muzzle to see that the bore is clean and bright.

The barrel is a little more than 24 inches long and the bore is rifled. The rifling consists of four plain grooves which are only a two-hundred-fiftieth of an inch in depth and not quite a sixth of an inch in width. The lands are the parts of the bore between the grooves and are one-third as wide as the groove. The rifling makes one complete turn around the bore in every 10 inches. The rifle is .30 caliber, which means that the diameter of the bore is thirty one-hundredths of an inch.

To Replace Magazine Mechanism.—Insert the follower and magazine spring in the magazine, place the tenon on the front end of the floor plate in the recess in the magazine, then place the lug on the rear end of the floor plate in its slot in the guard, and press the rear end of the floor plate forward and inward at the same time, forcing the floor plate into its seat in the guard.

To Replace the Bolt in the Rifle.—See that the cut-off is at the center notch; hold the rifle under the floor plate in the fingers of the left hand, the thumb extending over

the left side of the receiver; take the bolt in the right hand with safety lock in a vertical position and safety lug up; press rear end of follower down with left thumb and push bolt into the receiver; lower the bolt handle; turn safety lock and cut-off down to the left with the right hand; let down the firing pin by squeezing the trigger with the forefinger of the right hand, holding the cocking piece with the right thumb in order that firing pin may be let down gently and without jar.

No further dismounting of the rifle should be attempted by the beginner. The stock should never be removed except for making repairs, and then only by some selected and instructed man.

CHAPTER TWO.

Care of the Rifle.—Instructions on Manipulation.—Precautions against Accidents.

It must be borne in mind that the rifle is a machine, a piece of very delicate mechanism, and it should be handled accordingly.

Always look at the rifle; a rifleman should never let his rifle look at him.

Never point a rifle, loaded or unloaded, at anyone, unless it is intended to kill him.

Nearly all accidents with firearms are caused by lack of ordinary care.

Every rifle should be considered as loaded until it has been examined and found to be not loaded.

In the military service it is required that, to prevent accidents, the bolt be drawn back and magazine examined when details, detachments and other bodies of troops are first formed and again just before they are dismissed.

It should be an invariable rule for every man to follow whenever he takes up a rifle, even though he is positive that it is not loaded, that he open the bolt and assure himself that there are no cartridges in the chamber or the magazine. When the rifle is to be put away, the bolt should again be opened, and when it is seen that the rifle is empty, the bolt is to be closed and the firing pin let down.

No rifle should be laid away or put into an arm-rack when it is cocked, as there is always the liability that it may be loaded; and again, the compression of the mainspring will tend to weaken it, and in time it will not have force enough to explode a cartridge.

When leaving the firing point after firing, the bolt should always be open, so that all may see that the rifle is empty.

On the target range do not aim at the targets when in rear of the firing points. The practice of aiming and

snapping at the targets while in rear of men who are at the firing points should never be permitted.

Soldiers are not allowed to carry the rifle loaded, nor with cartridges in the magazine, except when specially ordered.

Under no circumstances should the firing pin be let down by the hand on a cartridge in the chamber.

If it is necessary to carry the rifle cocked, with a cartridge in the chamber, the bolt mechanism must be secured by turning the safety lock to the right.

The rifle is carried habitually with the firing pin let down on an empty chamber. It must never be carried cocked and unlocked, even though it is known to be not loaded.

The bolt must be drawn fully to the rear in opening it, otherwise the empty shell will not be thrown out by the ejector and when the bolt is closed it will not catch the top cartridge in the magazine.

In closing the bolt, be sure that the handle is down; if the handle is not down, when the trigger is squeezed the force of the mainspring will be expended in closing the bolt instead of in exploding the cartridge. For the same reason, care must be used to avoid an unintentional raising of the bolt handle with the hand when aiming.

In case of a misfire, it is unsafe to draw back the bolt immediately, as it may be a case of hang-fire, and the cartridge may explode while the bolt is being opened, with disastrous results. Whenever the cartridge fails to explode, the rifle should be cocked by drawing back the cocking piece with the thumb and forefinger of the right hand and the trigger again squeezed.

The cut-off is kept turned "Off" except when actually using cartridges. In simulated loading and firing the motions are made as though the magazine were in use. When cartridges are to be used, the instructor cautions the men to turn the cut-off "On."

When the bolt is closed, or when it is slightly forward, the cut-off may be turned down or up as desired. When the bolt is in its rearmost position and it is desired to pass from loading from the magazine to single loading, first

force the top cartridge—or the follower, if there are no cartridges in the magazine—below the reach of the bolt; next push the bolt slightly forward and then turn the cut-off down, showing "Off."

The muzzle is a very important part of the rifle and must be carefully guarded against damage. It is rounded to protect the rifling and any injury to it must be avoided. Any little damage to the muzzle is liable to injure the rifling, allow the gases to escape unevenly, and the shooting qualities of the rifle are ruined.

Never use emery cloth or any other harsh abrasive in the bore, which must be kept clean and well oiled, so as to avoid rust.

Tompions or plugs of cloth, wood or other material should not be put into the muzzle of the rifle.

Always use great care to prevent damage to the front and rear sights. A blow on either sight from a fall or other accident is liable to render the rifle useless as an accurate shooting weapon until repairs are made.

When not actually in use, the rear sight leaf must be laid down. Do not carry the rifle with the rear sight leaf standing up. The leaf is to be handled gently and lowered with care, not slammed down.

In lowering the rifle to the ground, it must always be lowered gently. Allowing the piece to drop through the right hand to the ground, or other similar abuse of the rifle, is prohibited.

Use the rifle as a rifle and for no other purpose. Using it as a rest to sit on or as a mallet to drive tent stakes is sure to ruin its accuracy.

Avoid the bad practice of "snapping" on an empty chamber. When practicing the trigger-squeeze exercise, use dummy cartridges.

The stock and hand guard must be protected from moisture and consequent swelling; they may be coated with raw linseed oil and polished by rubbing with the hand. This oil is considered necessary for the preservation of the wood. Wax or varnish, including heelball, must not be used on the rifle.

The Regulations for the Army of the United States prohibit the polishing of blued or browned parts of small

arms, rebluing or rebrowning, putting any portion of an arm in the fire or removing a receiver from a barrel. The mutilation of any part by filing or otherwise and attempts to beautify or change the finish are also prohibited. It is required that rifles "will be unloaded before being taken to quarters or tents and as soon as the men using them are relieved from duty, unless otherwise ordered."

CHAPTER THREE.

Ammunition for the United States Rifle.—Loading and Firing.—The Motion of Bullets.

The Ball Cartridge, Model of 1906.

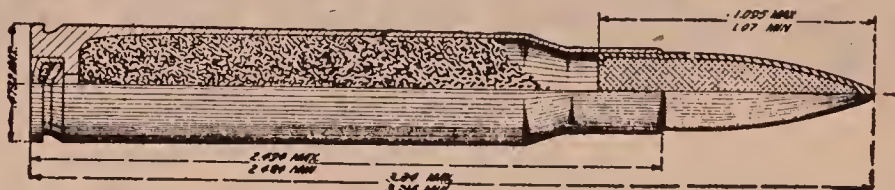


Fig. 10.

The caliber .30 Ball Cartridge consists of the brass case, the primer in the rear end of the cartridge case, a charge of from 47 to 50 grains of smokeless powder, giving an initial velocity of 2700 feet a second, and a bullet weighing 150 grains, made of a lead and tin composition covered with a jacket of cupro-nickel. Five cartridges are packed in a clip.

The Blank Cartridge, Model of 1906.

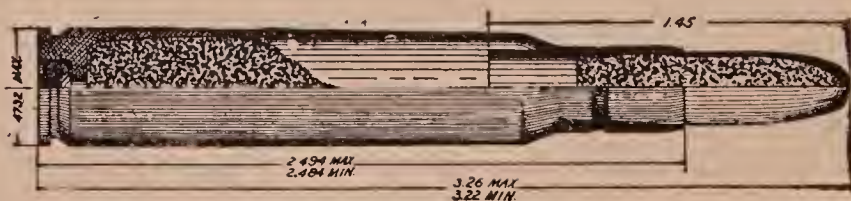


Fig. 11.

The Blank Cartridge, model of 1906, differs from the ball cartridge in the charge of powder, in the bullet, and in the fact that the case is tinned. The bullet is of paper, hollow, and contains a small charge of smokeless powder, which insures the breaking up of the bullet on leaving the bore. This charge is retained in the bullet by a drop of shellac. A coating of paraffin on the outside of the bullet prevents the absorption of moisture by the paper. The propelling charge is 10 grains.

The Blank Cartridge, Model of 1909.

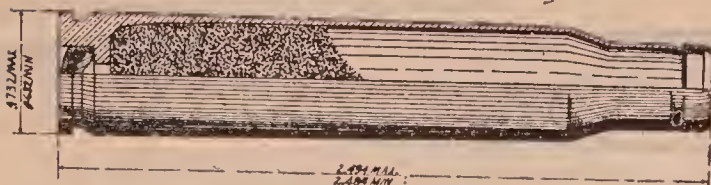


Fig. 12.

In the manufacture of these blank cartridges, cases are used which have been fired, or which have slight defects, rendering them unsuitable for use in ball cartridges. The charge is 12 grains. The case is closed by means of a paper cup inserted in the mouth of the case and shellacked to render the ammunition waterproof.

The Dummy Cartridge.

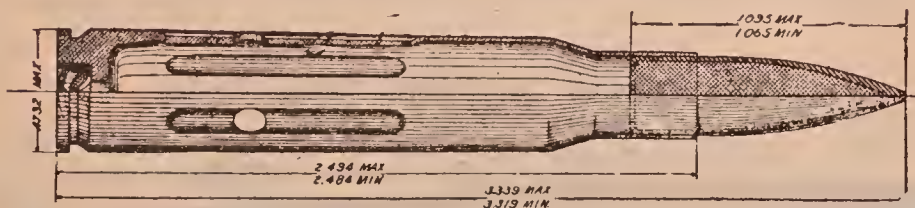


Fig. 13.

The Dummy Cartridges are used for practice in loading and simulated firing. They are especially useful in practicing the manipulation for rapid fire. The case is tinned and provided with six longitudinal corrugations, also three circular holes in the corrugated portion. The tinning, corrugations and holes afford unmistakable means for distinguishing the dummy from the ball cartridge, both by sight and touch. The bullet is the same as in the ball cartridge.

The Guard Cartridge, Old Model.



Fig. 14.

The old model Guard Cartridge, for use by sentinels when on guard duty, differs from the ball cartridge in the charge of powder and in the fact that second-class bullets having slight imperfections are used. Five cannelures encircle the body of the case at about the middle, affording means for distinguishing it from the ball cartridge by either sight or touch. The smaller charge of powder gives an initial velocity of 1200 feet a second. This cartridge gives good results at 100 yards and has sufficient accuracy for use at 150 and 200 yards. The range of 100 yards requires a sight elevation of 450 yards, and ranges of 200 and 300 yards require elevations of 650 and 850 yards, respectively.

The Guard Cartridge, New Model.

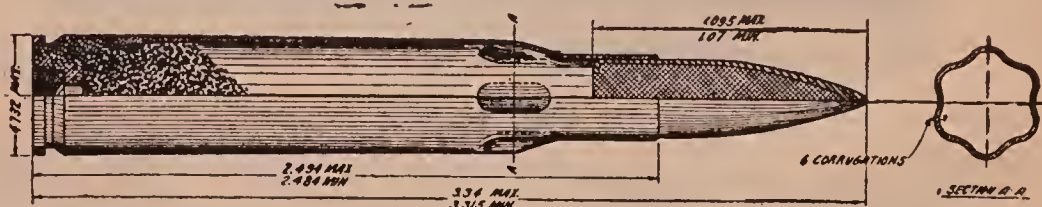


Fig. 15.

The new model Guard Cartridge differs from the old model in that six longitudinal corrugations three-sixteenths of an inch long start from the shoulder of the case. This affords means of distinguishing the guard cartridge from the ball cartridge. The new model has the same charge of powder, initial velocity, etc., as the old model.

Loading and Firing the Rifle.

To load the rifle, raise the bolt handle and draw back the bolt after turning the cut-off up, showing "On." Take a clip of cartridges with the right hand and insert the end in the clip slots, place the thumb on the center of the powder space of the top cartridge, the fingers extending around the rifle with tips resting on the magazine floor plate; force the cartridges into the magazine by a steady downward pressure of the thumb. It is important that the thumb be placed in the right position on the top cartridge, as the cartridges will jam together or spread apart if the thumb be placed too far forward or to the rear, resulting in a delay in loading.

The bolt may be thrust home without removing the empty clip, but it is better to pull the clip out with the fingers before closing the bolt.

Closing the bolt forces the top cartridge into the chamber, the parts occupy the position shown in Fig. 4, and the rifle is ready to be fired.

When the trigger is squeezed, the sear nose is withdrawn from in front of the cocking piece, which moves forward rapidly, causing the point of the striker to hit the primer, which explodes.

The Projectile Force.

The explosion of the primer sets fire to the powder, which gives rise by the decomposition of the powder to a large amount of gas, which, being highly elastic, endeavors to occupy a space much greater than that in which the powder was contained, and consequently exerts considerable pressure in every direction. The pressure to the rear causes the recoil or "kick"; the pressure to the front forces the bullet from the cartridge case, through the bore and out of the muzzle, the grooves causing the bullet to rotate from left to right. This pressure, called the projectile force, causes the bullet to move with ever-increasing speed until it issues from the barrel of the rifle, at which time it is moving at the rate of 2700 feet a second, that being the initial velocity of the present ammunition.

The Line of Fire.

If, after leaving the muzzle, the bullet were subjected to no other forces, it would continue to move in a straight line, following the direction of the axis of the bore, which is called the line of fire, and with a velocity the same as the initial velocity.

Resistance of the Air.—Force of Gravity.—Trajectory.

Upon issuing from the muzzle of the rifle the bullet is influenced by the resistance of the air, which gradually diminishes the velocity of the bullet, and by the force of gravity, which changes the direction of the bullet by drawing it toward the earth, making its path through the air a curved line. This actual path which the bullet follows is called the trajectory.

As the bullet in its flight continually falls below the line of fire, it is evident that if the line of fire be directed on any object, the bullet will not hit it, but will strike below it. To counteract this fall of the bullet, the line of fire must be directed as much above the object as the bullet would strike below it if the line of fire were laid directly upon the object.

It is necessary that the object be kept in view as the direction of the line of fire is altered, and to accomplish this the eye must be so far raised above the breech as to see the object over the muzzle of the rifle. The rear sight is employed to fix the position of the eye when the line of fire is directed for an object at different distances.

CHAPTER FOUR.

Sighting the Rifle.—Blackening the Sights.—Sighting Exercises.

Before a shot is fired, it is necessary to learn how to sight the rifle at the object which it is desired to hit.

A straight line passing through the middle of the notch of the open rear sight, or the center of the peep, and the top of the front sight is called the line of sight.

The line of aim is the straight line through the middle of the notch of the open rear sight, or the center of the peep, and a point immediately below the mark (or object to be hit) and separated from it by a line of light. When looking along the line of aim, the top of the front sight is brought into this line, it is said to be "on the mark." If the sights are properly set, the mark will then be struck.

A point just below the mark, and not the mark itself, is taken as the point of aim, as it is impossible to know, if touching the mark with the top of the front sight, how much of the front sight is seen. Always see a well-defined line of light between the mark and the top of the front sight.

The Sighting Bar.

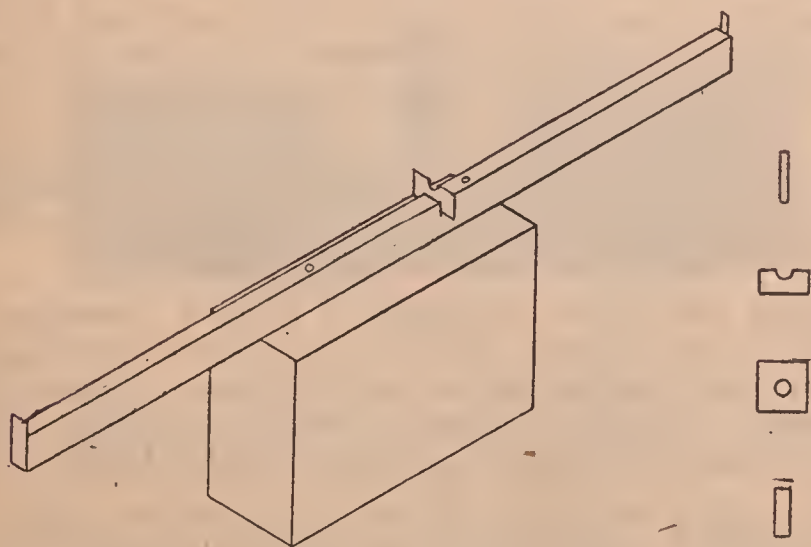


Fig. 16.

In studying the different kinds of sight which may be taken, a Sighting Bar will be found to be of great assistance. It can be easily made and consists of:

(a) A bar of wood about 1 by 2 inches by 4 feet, with a thin slot 1 inch deep cut across the edge about 20 inches from one end.

(b) A front sight of tin $\frac{1}{2}$ by 3 inches tacked to the end nearest slot and projecting 1 inch above bar.

(c) An eyepiece of tin 1 by 3 inches tacked to the other end of and projecting 1 inch above the bar, with a very small hole (0.03 inch) $\frac{1}{2}$ inch from top of part projecting above bar. This hole may be made with a small nail.

(d) An open rear sight of tin $1\frac{1}{2}$ by 3 inches, with a U-shaped notch $\frac{3}{4}$ inch wide cut in the middle of one of the long edges. This is placed in the slot on the bar. A slight bend of the part of the tin fitting in the slot will give enough friction to hold the sight in any part of the slot in which it is placed.

(e) A peep rear sight of tin 3 by 3 inches, with a peephole $\frac{3}{4}$ inch in diameter cut in the center. This replaces the open sight when the peep sight is shown.

Carefully blacken all pieces of tin and the top of the bar. Nail the bar to a box about 1 foot high and place on the ground, table or other suitable place.

On the wall about five yards away fasten a sheet of white paper with a black bull's-eye about two-thirds of an inch in diameter. (If a Y target can be obtained, it is just the right size for this purpose.)

Adjust the sheet of paper in such a position on the wall that when looking through the small hole in the tin eyepiece, the bull's-eye is seen slightly above the tin front sight, showing a line of white between the black bull's-eye and the blackened front sight of tin.

Next place the tin open rear sight in the slot, adjusting it so that a fine sight, as shown in Fig. 17, will be seen when looking through the eyepiece.

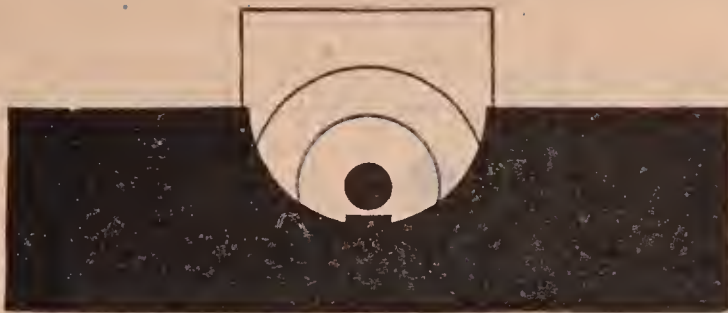


Fig. 17.

Fine Sight.—When only the tip of the front sight is seen above the bottom of the rear sight notch. This form of sighting is not recommended.

The tin open rear sight is then pushed down a little in the slot until the top of the tin front sight is level with the top of the rear sight. Then the half sight, as shown in Fig. 18, may be seen.



Fig. 18.

Half Sight.—When the top of the front sight, seen through the center of the rear sight notch, is in line with the top of the rear sight notch. This is known as the normal sight.

By pushing the tin open rear sight further down in the slot a full sight, as shown in Fig. 19, is seen.



Fig. 19.

Full Sight.—When all of the front' sight is seen through the center of the rear sight notch. This form of sighting is a fault which should be carefully avoided.

Before removing the tin open rear sight, it may be shifted a little to one side, illustrating the error of not sighting through the center of the rear sight notch.

Next place the tin peep rear sight in the slot, adjusting it so that a peep sight, as shown in Fig. 20, will be seen.



Fig. 20.

Peep Sight.—When the top of the front sight is seen in the center of the peep hole.

Moving the tin peep rear sight up, down and to the side will illustrate incorrect methods of sighting when using the peep sight.

Regular results in firing can be obtained only when the same amount of front sight is taken each time.

In sighting, look through the rear sight, keep your eye fixed on the bull's-eye, and bring the front sight into line. Do not fix the eye upon the front sight.

The eye can be focused accurately upon objects at but one distance at a time; all other objects in the field of view will appear more or less blurred, depending on their distance from the eye. This can be readily seen if a pencil is placed in the field of view near the eye, while looking at some distant object. The pencil will appear blurred. This is the condition met with by the normal eye in sighting a rifle. If the eye is focused on one of the three points—the bull's-eye, the front sight, or the rear sight—the other two will appear blurred. This blurring effect is best overcome by using the peep sight as though looking through a window and focusing the eye on the bull's-eye. The blurring of the peephole will be concentric, giving a clear and easily defined center. The blurring of the front sight will be less, but symmetrical on both sides, with very little blur on the top. It can be readily and naturally brought to the center of the peephole. Variations in light also have less effect on the peep than on the open sight.

But the limited field of view and lack of readiness in getting a quick aim with the peep sight necessitate for some men the use of the open sight—especially for rapid fire, and field practice. In this case the normal sight should be habitually used, as the horizontal line at the top of the notch of the rear sight affords a good guide for regularity, the blurring effect is partly overcome as in the peep sight, and there is more light than with the fine sight. With the fine sight the amount of front sight, apparently the same to the eye, varies with the

amount of light. With the full sight there is no guide for regularity.

The effect of the full sight is to cause a higher point of the object aimed at to be struck than if either of the other kinds of sight had been taken. The fine sight will cause a lower point to be struck.

Blackening the Sights.

The front and rear sights should be blackened for sighting and aiming exercises and before shooting. The smoke from a small piece of burning gum camphor gives the most satisfactory dead black, although the blackening may be done by using a candle, the burner of an oil lantern or matches. Liquid sight black is not recommended, as it is difficult to apply smoothly and is apt to spoil the outline of the peephole. Wipe the sights before blackening, cleaning out the peephole with a toothpick or a match. After blackening the rear sight, raise the slide and wipe off the uprights of the leaf, so that the numbers and lines can be easily seen. Wipe off the wind gauge scale.

Sighting Exercises.

These exercises will be found to be interesting and very valuable, particularly where several men are being instructed in the correct methods of sighting the rifle. A Sighting Rest for the rifle (Fig. 21) can be made by taking an empty revolver-ammunition box or a similar well-made box, removing the top and cutting notches in the ends to closely fit the rifle. It is better to pad the notches with cloth, which will prevent the rifle slipping or becoming scratched.

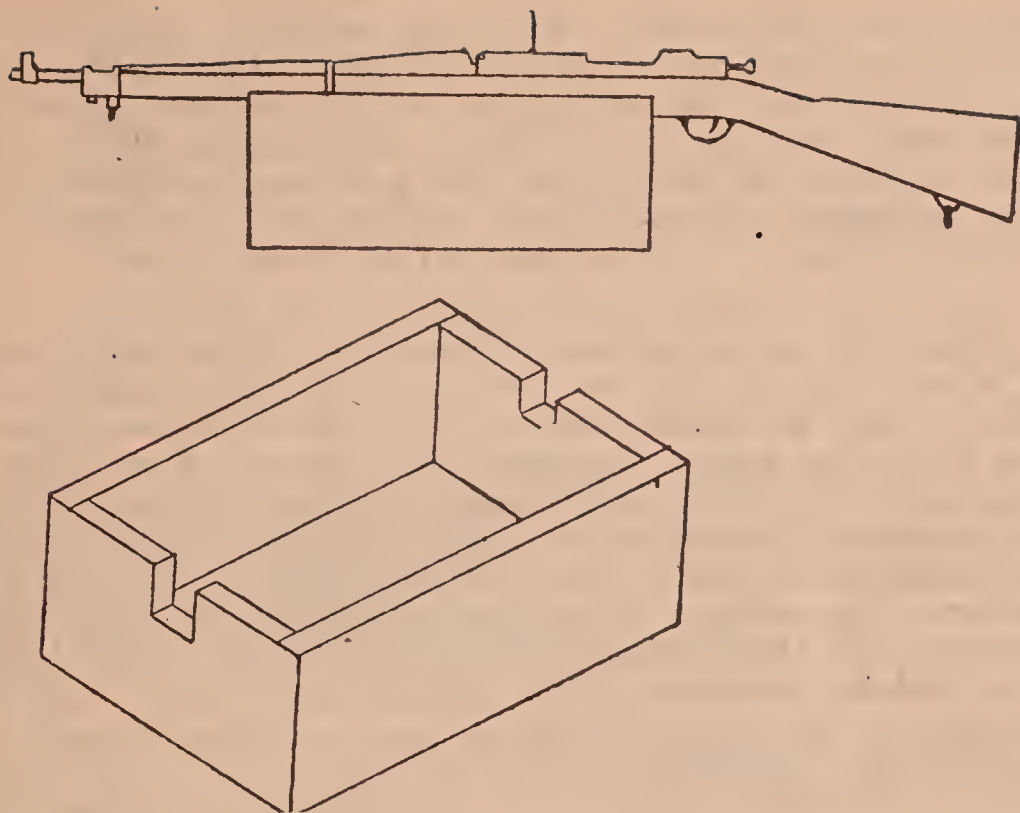


Fig. 21.

Place the rifle in these notches with the trigger-guard close to and outside one end. Nail a piece of board (top of box will do) to a stake or wall about 12 inches from the ground. Fasten a blank sheet of paper to the board. The instructor places the sighting rest firmly on the ground, 20 or 30 feet from the board, so that the rifle is not canted to the right or the left—the box may be weighted with sand if necessary—raises the rear sight leaf and sights the rifle at about the center of the blank sheet of paper. Changes in the line of sight for different men are made by changing the elevation and windage.

A man lies down with elbows on the ground, hands supporting the head, and the eye the same distance from the rear sight as in shooting. Another man, acting as marker, is provided with a pencil and a small rod bearing a disk of white cardboard about 3 inches in diameter, with a black bull's-eye, about an inch in diameter, pierced in the center with a hole just large enough to admit the

point of a lead pencil. The man sighting directs the marker to move the disk to the right, left, higher or lower, until the rifle is directed on the bull's-eye with a half sight, and then says, "Hold." The marker holds the disk carefully in place until the position is verified by the instructor. Errors, if any, will be explained and another trial made. This is done in turn by each man.

Men will sometimes be found who do not know how to place the eye in the line of sight; they often look over or along one side of the notch of the rear sight and believe they are aiming through the notch because they see it at the same time that they do the front sight. This error will probably be made evident by the preceding exercise. Some men in sighting will look at the front sight and not at the object. As this causes a blur, which prevents the object from being distinctly seen and increases both the difficulties and inaccuracies of sighting, it should be corrected.

Repeat the above exercise, using the peep sight in place of the open sight.

The Triangle of Sighting.

Using the sighting rest for the rifle, each man is required to direct the marker to move the disk until the rifle is directed just below the bull's-eye with a half sight, when the man sighting says, "Mark." At the command "Mark," being careful not to move the disk, the marker puts the point of his pencil through the hole in the center of the disk, makes a dot on the paper to mark the position of the disk, which is then withdrawn; being careful not to move the rifle or sights, the operation is repeated until three marks have been made.

Join the three points determined as above by straight lines, mark with the man's name, and call his attention to the triangle thus formed. The shape and size of this triangle will indicate the nature of the variations made in aiming.



Fig. 22.



Fig. 23.

If the triangle is obtuse-angled, with its sides approaching the vertical (Fig. 22), the man has not taken a uniform amount of front sight. If the sides of the triangle are more nearly horizontal (Fig. 23), the errors were probably caused by not looking through the middle of the notch or not over the top of the front sight. If any one of the sides of the triangle is longer than $\frac{1}{2}$ inch, the instructor directs the exercise to be repeated, verifying each sight and calling the man's attention to his errors. The instructor will explain that the sighting gains in regularity as the triangle becomes smaller.

If the sides of the triangle are so small as to indicate regularity in sighting, the instructor will mark the center of the triangle and then place the center of the bull's-eye on this mark. The instructor will then examine the position of the bull's-eye with reference to the line of sight. If the bull's-eye is properly placed with reference to the line of sight, the man aims correctly and with uniformity. If not so placed, he aims in a regular manner, but with a constant error.

If the bull's-eye is directly above its proper position, the man has taken, in aiming, too little front sight; or, if directly below, too much front sight. If directly to the right or left, he has not sighted through the center of the rear sight notch and over the top of the front sight. If to the right, he has probably either sighted along the left of the rear sight notch, or the right side of the front sight, or has committed both of these errors. If the bull's-eye is too far to the left, he has probably sighted

along the right of the rear sight notch, or the left of the front sight, or has combined both of these errors.

If the bull's-eye is placed with reference to its proper position diagonally above and to the right, the man has probably combined the errors which placed it too high and too far to the right. Any other diagonal position would be produced by a similar combination of vertical and horizontal errors.

As the errors thus shown are committed when the rifle is fixed in position, while that of the bull's-eye or target is altered, their effect will be directly opposite to the changes in the location of a hit in actual fire, occasioned by the same errors, when the target would be fixed and the rifle moved in aiming.

After the above instruction has been given to one man, the line of sight will be slightly changed by moving the sighting rest or by changing the elevation and windage, and the exercises similarly repeated with the others.

Repeat the exercise, using the peep sight.

Canting the Rifle.

When aiming, it is very necessary that the rifle be not canted, or tilted, to the right or left. The sights must be kept vertical. The tendency to cant the rifle is natural to beginners and is frequently increased when the sling is used as an aid in holding the rifle. If the piece is canted to the right, the bullet will strike to the right and below the point aimed at, even though the gun be otherwise correctly aimed and the sights correctly set. Similarly if the rifle is canted to the left, the bullet will strike to the left and low. The elevation fixes the height of the point where the bullet will hit the target, and the windage fixes the point to the right or left—i. e., the elevation gives vertical effects and the windage horizontal effects. Let a pencil (or rod) held vertical represent the elevation; now if the pencil is turned to the right 90 degrees, or horizontal, all of the elevation has been taken off, causing the shot to strike low, and changed into windage, causing the shot to strike to the right.

This effect may be practically demonstrated as follows: Use the sighting rest with the rifle firmly held

in the notches, the bolt removed. Paste a black paster near the center of the bottom line of the target. Sight the rifle on this mark, using about 2,000 yards elevation; then, being careful not to move the rifle, look through the bore and direct the marker to move the disk until the bull's-eye is in the center of the field of view and command, "Mark." Next turn the rest with the rifle on its side (say right), and with the same elevation sight on the same paster as above; then, being careful not to move the rifle, look through the bore and direct the marker again to move the disk until the bull's-eye is in the center of the field of view, and command, "Mark."

Not considering the fall of the bullet, the first mark represents the point struck with the sight vertical, the second mark represents the point struck, low and to the right, using the same elevation and the same point of aim, when the piece is canted 90 degrees to the right.

Different degrees of canting the piece can be represented by drawing an arc of a circle through the two marks with the paster as a center. The second mark will be at a point on this arc corresponding to the degree of canting the piece. This effect of canting increases with the distance from the target.

Other Exercises.

The instructor can devise other exercises which suggest themselves as useful and beneficial. The following are examples:

In strong sunlight make a triangle of sighting, using a rifle having sights worn bright. Then, being careful not to move the rifle, blacken the sights and make another triangle. Use dotted lines for the triangle made with bright sights and full lines for the triangle made with blackened sights. The position and size of the two triangles will plainly show the advantages of the blackened sights.

In strong sunlight make a triangle of sighting; then, being careful not to move the rifle, make another triangle, having first shaded the target and the man sighting.

The relative position of the triangles will show the importance of knowing the effects of varying degrees of light.

CHAPTER FIVE.

The Correct Positions for Firing the Rifle.—Position and Aiming Drills.—Practice in Aiming.—How to Squeeze the Trigger.

These position and aiming drills are intended so to educate the muscles of the arm and body that the rifle, during the act of aiming, shall be held without restraint, and during the operation of firing shall not be deflected from the target by any convulsive or improper movement of the trigger finger, or of the body, arms, or hands. They also establish between the hand and eye such a prompt and intimate connection as will insure that the finger shall act upon the trigger, giving the final pressure at the exact moment when the top of the front sight is seen to be directed upon the mark.

The fact, though simple, can not be too strongly impressed upon the beginner, that if at the moment the cartridge is discharged the piece is properly supported and correctly aimed, the mark will surely be hit. Then, since almost any intelligent man can be taught to aim correctly and to hold the sights aligned upon the mark with a fair amount of steadiness, it follows that bad shooting must necessarily arise from causes other than bad aiming. Of these causes the principal one is known to be the deflection given to the rifle at the moment of squeezing the trigger, due to the fact that the man, at the moment of firing, instead of squeezing the trigger, jerks it. This convulsive action is largely due to the lack of familiarity with the methods of firing, and to a constrained position of the muscles of the body, arms, and hands, which constrained position it is the purpose of the position and aiming drills to correct.

To become a good shot, constant, careful and patient practice is required. Systematic aiming and squeezing the trigger can do much to make a rifleman.

Advantage should be taken of every opportunity for practicing aiming and squeezing the trigger.

While these drills are intended to be under the super-

vision of an instructor, any individual can cover the course laid down by following the instructions.

Care should be taken not to make the position and aiming drills tedious nor objectionable. If possible, a short time every day should be spent in this practice.

These drills are divided into four progressive exercises. The first exercise teaches the position; the second exercise teaches the position and the aim; the third exercise teaches the aim and the manner of squeezing the trigger; and the fourth exercise teaches methods of rapid fire. The exercises at first should be taught by the numbers; when more fully understood, without numbers.

To correct any tendency to cant the rifle, the rear sight will be raised. A black paster about 1 inch in diameter, at which to aim, will be placed on the wall opposite each man. The men being formed in single rank, with intervals of 1 yard, the instructor directs them to take the position of "Ready"—that is, each man faces half right and carries the right foot to the right about 1 foot, to such a position as will insure the greatest firmness and steadiness of the body; the rifle is dropped into the left hand at the balance (center of gravity of the rifle), the left thumb extended along the stock, muzzle at the height of the breast, right hand grasping the small of the stock. The instructor then cautions, "Position and aiming drill."

The exercise which is being taught should be frequently repeated and made continuous, the instructor prefacing the preparatory command by "Continue the motion" or "At will," and giving the command "Halt" at the conclusion of the exercise, when the men will return to the position of "Ready" as above. Or the men may be required to repeat the first and second motions by the command "One," "Two," the exercise concluding at the command "Halt."

Position Exercise.

The instructor commands: 1. Position. 2. Exercise. At the last command, without moving the body, head, or eyes, raise the rifle smartly to the front of the right shoulder to the full extent of the left arm; elbow inclined

downward; the barrel nearly horizontal; muzzle slightly depressed, heel of the butt on a line with the top of the shoulder.

(Two.) Bring the rifle smartly against the hollow of the shoulder, without permitting the shoulder to give way; press the rifle against it, mainly with the right hand, only slightly with the left; the forefinger of the right hand resting lightly against the trigger; the rifle inclined neither to the right nor left.

(Three.) Resume the position of "Ready."

The instructor should especially notice the position of each man in this exercise, endeavoring to give to each one an easy and natural position. He should see that the men avoid drawing in the stomach, raising the breast, or bending the small of the back.

The butt of the rifle must be pressed firmly, but not too tightly, into the hollow of the shoulder, and not against the muscles of the upper arm. If too tightly held, the pulsations of the body will be communicated to the rifle; if too loosely, the recoil will bruise the shoulder. If only the heel or toe touches the hollow of the shoulder, the recoil may throw the muzzle down or up, affecting the position of the hit. While both arms are used to press the rifle to the shoulder, the left arm should be used to direct the rifle and the right forefinger must be left free to squeeze the trigger.

Aiming Exercise.

The instructor will first direct the sights to be adjusted.

The instructor commands: 1. Aiming. 2. Exercise.

At the last command, execute the first and second motion of the position exercise.

(Two.) Bend the head a little to the right; the cheek resting against the stock; the left eye closed; the right eye looking through the notch of the rear sight at a point slightly below the mark. (Three.) Draw a moderately long breath, let a portion of it escape, then, with the lungs in a state of rest, slowly raise the rifle with the left hand, being careful not to incline the sight to either side until the line of sight is directly on the mark; hold the rifle

steadily directed on the mark for a moment, then, without command and just before the power to hold the rifle steadily is lost, drop the rifle to the position of "Ready" and resume the breathing.

Some riflemen prefer to extend their left arm. Such a position gives greater control over the rifle when firing in a strong wind or at moving objects. It also possesses advantages when a rapid as well as accurate delivery of fire is desired.

The eye may be brought to the line of sight either by lowering the head or by raising the shoulder; it is best to combine somewhat these methods; the shoulder to be well raised by raising the right elbow and holding it well to the front and at right angles to the body.

If the shoulder is not raised, it will be necessary for the rifleman to lower the head to the front in order to bring the eye into the line of sight. Lowering the head too far to the front brings it near the right hand, which grasps the stock. When the gun is discharged this hand is carried by the recoil to the rear and, when the head is in this position, may strike against the nose or mouth. This often happens in practice, and as a result of this blow often repeated, many men become gun-shy, or flinch, or close their eyes at the moment of discharge. Much bad shooting ascribed to other causes is really due to this fault. Raising the right elbow at right angles to the body elevates the right shoulder, and this lifts the rifle so that it is no longer necessary to incline the head materially to the front in order to look along the sights.

The length of the man's neck determining greatly the exact method of taking the proper position, the instructor will be careful to see that the position is taken without constraint.

While raising the line of sight to the mark, fix the eye on the mark and not on the front sight; the latter can then be readily brought into the line joining the rear-sight notch and mark. If this plan be not followed, when firing is held on the range at long distances, the mark will generally appear blurred and indistinct. The front

sight will always be plainly seen, even though the eye is not directed particularly upon it.

The rifle must be raised slowly, without jerk, and its motion stopped gradually. In retaining it directed at the mark, care must be taken not to continue the aim after steadiness is lost; this period will probably be found to be short at first, but will quickly lengthen with practice. No effort should be made to prolong it beyond the time that breathing can easily be restrained. Each man will determine for himself the proper time for discontinuing the aim.

The men must be cautioned not to hold the breath too long, as a trembling of the body would, in many cases, result.

Trigger-squeeze Exercise.

The instructor commands: 1. Trigger-squeeze. 2. Exercise.

At the command "Exercise," the men will execute the first motion of the aiming exercise. At the command "Two," the second motion of the aiming exercise.

(Three.) Draw a moderately long breath, let a portion of it escape, hold the breath and slowly raise the rifle with the left hand, being careful not to incline the sights to either side, until the line of sight is on the mark; contract the trigger finger gradually, slowly and steadily increasing the pressure on the trigger while the aim is being perfected; continue the gradual increase of pressure so that when the aim has become exact the additional pressure required to release the point of the sear can be given almost insensibly and without causing any deflection of the rifle. Continue the aim a moment after the release of the firing pin, observe if any change has been made in the direction of the line of sight, and then resume the position of "Ready," cocking the piece by raising and lowering the bolt handle.

Poor shooting is too frequently the result of lack of proper co-ordination of holding the breath, the maximum steadiness of aim, and the squeeze of the trigger. By frequent practice in this exercise, each man should know the exact instant his firing pin will be released, and he

must hold the breath, bring the sights to bear upon the mark, and squeeze the trigger all at the same time.

The trigger should be squeezed, not pulled, the hand being closed upon itself, as a sponge is squeezed, the forefinger sharing in this movement.

The forefinger should be well around the trigger, which must not be squeezed with the first joint of the finger.

If the trigger has been pulled with a jerk instead of being squeezed, the muzzle of the rifle will probably be diverted to the right, or possibly downward, at the moment of firing; it is with the object of discovering this error, if made, that the aim is continued after the firing pin has been released and the exact point noticed where the rifle is then directed. If at some point other than the mark, every effort should be made, during subsequent practice at this exercise, to avoid pulling the trigger with a jerk.

The value of this exercise lies largely in that by means of it each man becomes familiar with the trigger-squeeze of his rifle. Knowing this, he is able at any time to judge, within limits, what additional pressure is required for its discharge. By constant repetition of this exercise he should be able finally to squeeze the trigger to a certain point, beyond which the slightest movement will release the sear. Having squeezed the trigger to this point, the aim is corrected and, when true, the additional pressure is applied and the discharge follows.

Rapid-fire Exercise.

The instructor commands: 1. Rapid-fire exercise. 2. Commence firing. At the first command, the first and second motions of the trigger-squeeze exercise are performed. At the second command, each man performs the third motion of the trigger-squeeze exercise, squeezing the trigger without disturbing the aim or the position of the piece, but at the same time without undue deliberation. He then, without removing the rifle from the shoulder, holding the piece in position with the left hand, grasps the handle of the bolt with the right hand, rapidly draws back the bolt, closes the chamber, aims, and again squeezes the trigger. This movement is repeated until

the trigger has been squeezed five times, when, without command, the piece is brought back to the position of "Ready."

The object of this exercise is to teach the men to shoot quickly and at the same time accurately. Good target shots are not infrequently poor game shots. On the battle-field, as well as on the hunting-field, the target is constantly changing, and opportunities to fire with effect are fleeting. It follows that ability quickly to catch the aim, to squeeze the trigger promptly, without disturbing the aim, and to get in, in quick succession, several well-directed shots on a vanishing target, is of great value.

The methods of taking position, of aiming, and of squeezing the trigger, taught in the preceding exercises, should be carried out in the rapid-fire exercise, with due attention to all the details taught therein; the details being carried out as prescribed, except that greater promptness is necessary. In order that any tendency on the part of the rifleman to slight the movements of aiming and of trigger-squeeze shall be avoided, the rapid-fire exercise will not be taught until each man is thoroughly drilled and familiar with the preceding exercises. The men will be instructed that with practice in this class of fire the trigger can be squeezed promptly without deranging the rifle.

In rapid fire in all positions most men find that it is better to place the right thumb along the stock to the right of the cocking-piece, instead of attempting to place it over the top of the small of the stock.

If any man seems to execute the exercise hurriedly or carelessly, the instructor will require him to repeat it at a slower rate.

To hold the piece to the shoulder, and at the same time manipulate the breech mechanism with the proper facility, is only learned after much practice. Some riflemen, especially men who shoot from the left shoulder, find it easier, in rapid firing, to drop the piece to the position of "Load" after each shot. While at first trial this

method may seem easier, it is believed that, with practice, the advantage of the former method will be apparent.

After the first few drills in rapid fire, dummy cartridges should always be used in practicing for this class of fire, as their use requires the bolt to be drawn fully to the rear when loading.

Do not press the bolt to the left in drawing it back, as the pressure causes the ejector to bind, making it harder to move the bolt.

Position and Aiming Drill, Kneeling.

The slow- and rapid-fire exercises will be repeated in the kneeling position.

To kneel, half face to the right; carry the right toe about 1 foot to the left rear of the left heel; kneel on right knee, sitting as nearly as possible on the right heel; the left forearm across the left thigh.

The exercise will be executed as prescribed for standing, except that at the command "Two" in the position exercise, the rifleman will rest the left elbow on the left knee, the point of the elbow in front of the kneecap. The pasters for the kneeling exercise should be $2\frac{1}{2}$ feet from the floor or ground.

Frequent rests will be given during practice in these exercises kneeling, as the position, if long continued, becomes constrained.

In raising the rifle to the mark in the second and third exercises, the position of the left hand should not be changed, but the left forearm should be brought toward the body and at the same time the body bent slightly to the rear.

When aiming kneeling there is, from the nature of the position, a tendency to press the butt of the rifle against the upper arm instead of against the hollow of the shoulder; this will necessitate inclining the head considerably to the right to get the line of sight, and by bringing the rifle so far to the rear will, if the thumb is placed across the stock, cause it to give by the recoil a blow upon the nose or mouth.

These difficulties can be avoided by advancing the right elbow well to the front, at the same time raising

it so that the arm is about parallel with the ground. The hollow of the shoulder will then be the natural place for the rifle butt, and the right thumb will be brought too far from the face to strike it in the recoil.

Some riflemen prefer, by bending the ankle, to rest the instep flat on the ground, the weight of the body coming more on the under part of the heel; this obviates any tendency of the right knee to slip; or, by resting the right side of the foot on the ground, toe pointing to the front, to bring the weight of the body on the left side of the foot.

In firing kneeling, the steadiness obtained depends greatly upon the position adopted. The peculiarities of conformation of the individual man exert, when firing kneeling, a greater influence than when firing either standing, sitting, or lying down; the instructor should therefore carefully endeavor, noticing the build of each man, to place him in the position for which he is best adapted and which will exert the least tension or strain upon the muscles and nerves. It should be remembered, however, that without the rest of the left elbow on the knee, this position possesses no advantage of steadiness over the standing position.

The kneeling position can be taken more quickly than either the sitting or the prone position. It is, therefore, the position naturally assumed when a rifleman, who is standing or advancing, has to make a quick shot at a moving or disappearing object and desires more steadiness than can be obtained standing.

In rapid fire kneeling, hold the rifle lightly with the left hand, as hard holding with that hand when firing rapidly causes trembling, with a consequent inability to catch quickly a correct aim. Keep the rifle in position with butt at the shoulder when manipulating the bolt.

Position and Aiming Drill, Sitting Down.

In many cases the men, while able to kneel and hold the rifle moderately steady, can yet in a sitting position

obtain much better results. All should, therefore, be instructed in aiming sitting down as well as kneeling.

To practice the preceding slow- and rapid-fire exercises in a sitting position, the instructor commands: "Sit Down."

At this command, make a half face to the right and, assisted by the left hand on the ground, sit down, facing slightly to the right, the left leg directed to the front, the right leg inclined toward the right, both heels, but not necessarily the bottoms of the feet, on the ground, the right knee slightly higher than the left; body erect, and carried naturally upon the hips; at the same time drop the muzzle of the rifle to the front, and to the position of the first motion of "Load," right hand upon the thigh, just in front of the body, the left hand slightly above but not resting upon the left leg.

The exercises will be executed as heretofore prescribed, except that at the command "Two" (position exercise), the man will rest the left elbow on the left knee, the point of the elbow in front of the kneecap, and the right elbow against the left or inside of the right knee, at the same time inclining the body from the hips slightly forward.

For the aiming and trigger-squeeze exercises the pasters will be $2\frac{1}{2}$ feet from the floor or ground.

If the preceding position is carefully practiced, steadiness is quickly attained. The right leg should not be carried so far to the right as not to afford a good support or brace for the right elbow.

This position can be modified, by crossing the legs at the ankle, the outside of each foot resting upon the ground, body more erect, and the knees slightly more raised than in the previous position. This position is an excellent one for many men.

In rapid fire sitting, the bolt should be manipulated without removing the rifle from the shoulder and without raising either elbow from its position on the leg. As soon as the trigger is squeezed, grasp the bolt handle with the right hand and at the same time with the left hand push the rifle to the right and downwards, this movement of the left hand assisting in the raising of the bolt.

by the right hand; draw the bolt quickly to the rear with the right hand, being careful not to press to the left; close the bolt with the right hand and at the same time bring the rifle back to its former position with the left hand, this return movement of the rifle assisting in the closing of the bolt. It will be found with practice that this method of working the bolt is the easiest, quickest, and most productive of good results, the rifle returning to the proper position for an almost perfect aim for the next shot.

Position and Aiming Drill. Lying Down.

From the nature of the position, it is not practicable to execute the preceding exercises according to the method followed when standing or kneeling; instruction will, however, always be given with reference to the position, to the manner of assuming it, and to aiming and squeezing the trigger.

For the exercise lying down the black pasters should be about 12 inches from the floor.

The instructor commands: "Lie Down," at which command the men kneel, but with the right knee against the left heel, carry back the left foot, and lie flat on the belly, inclining the body slightly to the right; rifle horizontal, barrel up, muzzle off the ground and pointed to the front; elbows on the ground; left hand at the balance, right hand grasping the small of the stock opposite the neck; the legs may be spread apart and the toes turned out if found to give a steadier position.

Having taken the position as prescribed, the legs should be inclined well to the left, and either crossed or separated as the man prefers or his particular conformation appears to render most desirable.

If care is exercised, a position of steadiness and ease can then, with practice, be quickly assumed.

Being at a "Ready," the instructor then commands: 1. Trigger-squeeze. 2. Exercise.

At the latter command, carry the left elbow to the front and slightly to the right: the left hand under the barrel at the balance; weight of the body mainly sup-

ported by the left elbow, the right resting lightly on the floor or ground.

(Two.) Slide the rifle with the right hand through the left hand to the front, until the left hand is a little in front of the trigger guard; at the same time raise the rifle with both hands and press it against the hollow of the shoulder.

(Three.) Direct the rifle upon the mark, and carry out the further details of aiming and squeezing the trigger. Then resume the position, lying down.

As soon as the men have acquired with accuracy the details of the position, they will be practiced, without numbers, aiming and squeezing the trigger at will; but care will be taken not to unduly prolong the exercise.

The preceding position for firing lying down, possesses, in greater degree than other positions, the merit of adaptability to changes in the configuration of the ground; it enables the rifleman to deliver fire over low breastworks or improvised shelters, thus making the best use of cover.

In the prone position, when aiming, the left elbow should be well under the barrel, the other elbow somewhat to the right, but as near the body as possible; when the right elbow is too far to the right there is a tendency to slip on the floor or ground; the head elevated, the right shoulder well raised, and the rifle pressed firmly against it with both hands.

The greater changes in elevation required in first directing the rifle on the object should be given by altering the position of the left hand under the barrel; the slighter changes only by advancing or withdrawing the shoulder.

The body not yielding to the recoil, as when firing standing or kneeling, its force, if the rifle is not properly held, may severely bruise the shooter. It is one of the objects of this exercise so to teach him that this will be prevented. Care must be exercised that the butt is not brought against the collar bone. By moving the shoulder slightly to the front or rear, and by moving the right elbow from the body or toward it, each man can determine the position in which the shoulder gives to the butt

of the rifle the easiest rest. This will probably be the one in which the force of the recoil will be least felt.

The rifleman should persist in this exercise until he obtains a position in which he feels no constraint, which will not subject him to bruises from the recoil, and from which the mark appears plainly through the sights. Having secured such a position, he must not change it when firing, as a variation in the points of support of the rifle, the distance of the eye from the rear sights, or the tension of the hold has a decided effect, especially at the longer ranges, upon the location of the point struck.

In rapid fire in the prone position, the bolt should be manipulated as described for rapid fire sitting, without moving the rifle from the shoulder and without raising either elbow from its position on the ground.

If these aiming and trigger-squeeze exercises are carefully practiced in the different positions, the beginner, before firing a shot at a target, will have learned to correctly aim his rifle, to hold it steadily, to squeeze the trigger properly, and to assume that position best adapted to the particular conformation of his body. This knowledge can not be successfully acquired upon the target ground. At that place the time that can be given to instruction is limited, and should be devoted to the higher branches of the subject; and even if the desired amount of attention could be given to each man, yet, from the circumstances of the firing, the determination of his errors can not be readily made. It is more than likely that he will never discover the reasons for his failures, and will therefore be unable properly to correct them.

Under such conditions the knowledge that he may have of the many other requisites for good marksmanship can not be utilized to full advantage, and in fact can but in a limited degree compensate for the neglect of these first principles, and for the failure to lay, by assiduously practicing them, the only firm foundation for future proficiency.

The Aiming Device.

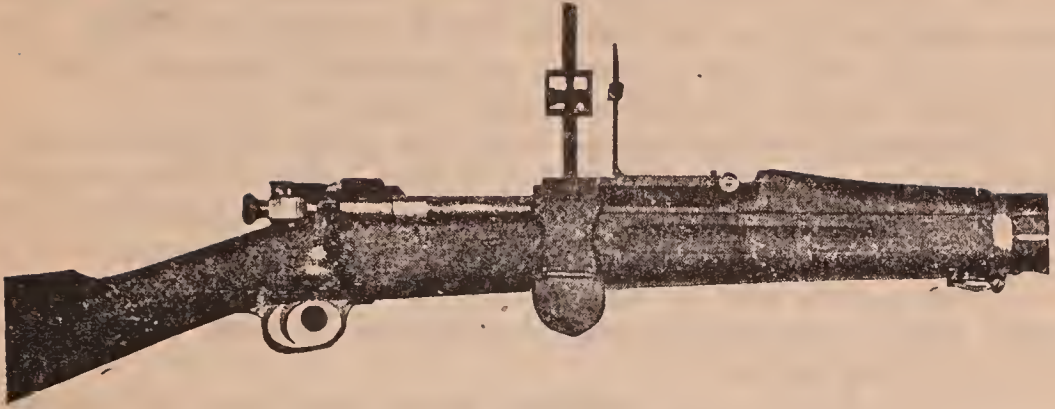


Fig. 24.

The Aiming Device (Fig. 24, in place on the arm, and Fig. 25, in detail) is intended for use in aiming drill. By it the instructor, while standing on one side and facing the rear sight on the rifle when the rifleman is in the act of aiming, can see the reflection of both sights and the object aimed at, and can therefore judge of the accuracy and steadiness of the man's aim.



Fig. 25.

The device consists of a circular spring steel clip (A), which embraces the barrel and a portion of the stock immediately in rear of the rear sight; a standard (B), riveted to the clip; and a sheet steel cage (C), mounted on the standard, which carries a glass reflector (D).

The ends of the spring clip are covered with leather to prevent marring of the barrel and stock. This leather cover terminates in two loose flaps, by which the clip can be spread in seating and removing the device.

The upper end of the standard is drilled and tapped for a screw eye (E), which prevents accidental removal of the reflector cage.

The reflector cage consists of a back and a top and bottom. To the back is riveted a piece of sheet steel, shaped to engage the standard, forming a sliding bearing for the cage on the standard. A flat leaf spring (F), secured in this bearing, gives sufficient friction on the standard to hold the cage at the desired height. The top and bottom of the cage contain grooves, set at an angle of 45 degrees with the barrel, in which is seated the reflector glass. The glass itself is plain sheet glass, slightly smoked, with its edges rounded. The cage, standard, and clip are blued to prevent glaring reflection from sunlight and, in the case of the cage, to furnish a mirror back for the glass.

To use the aiming device, it should be seated firmly on the gun just in rear of the rear sight, taking care that the standard is vertical. The exposed edge of the reflector glass must always be to the rear, in order to obtain a reflection of the sights. If the instructor desires to stand upon the rifleman's right, the device must be placed on the gun so that the standard is on the left; if on the other side, the standard must be on the right side of the gun. In changing from one side to the other, it is necessary to slip the cage off the standard and reverse it. The cage can be raised or lowered on the standard to suit the elevation used on the rear sight.

CHAPTER SIX.

The Adjustment and Use of the Gun Sling.

After the position and aiming exercises have been practiced a few times, the gun sling should be used on the arm when practicing in all positions. The use of the sling is authorized at all ranges as an auxiliary to steady the rifle in connection with one arm only, provided that for purposes of adjustment for shooting, neither end shall have been passed through either sling swivel. No knot will be tied in the sling, and the sling itself will not be added to or modified in any manner.

The sling is made of four parts: the long strap, the short strap, and two keepers. To assemble it, the plain end of the long strap is passed through the larger keeper, then through the metal loop of the short strap, passing from the undressed to the dressed side of the latter, then back through the larger keeper, forming the arm-loop, dressed side out. The same end is then passed through the smaller keeper, through the upper sling swivel from the butt toward the muzzle, and back through the smaller keeper, the arm-loop being completed by engaging the claw of the long strap in the proper holes in the other end of same.

The size of the arm-loop is adjusted to suit the individual who is to fire the rifle, the loop being drawn through the upper swivel until the claw comes well up toward the upper swivel. The claw end of the short strap is then passed through the lower swivel from muzzle to butt and brought up and engaged in the proper holes in the long strap, drawing the sling taut. This gives the parade position of the sling.

To adjust the sling for firing or carrying, the claw of the short strap is disengaged and re-engaged in the holes near the claw end of the short strap, no change being necessary in the adjustment of the arm-loop.

To adjust the sling to the arm, hold the rifle with the right hand at the small of the stock, butt against the right thigh, barrel up, muzzle pointed to the front and at the height of the breast, sling hanging loose. Thrust the left hand and arm through the arm-loop, putting the

hand in from the right side of the loop. Steady the rifle with the left hand above the lower band, and with the right hand shove the arm-loop up the left arm above the left elbow and secure it in place with the keeper. Re-grasp the rifle with the right hand at the small of the stock and turn the left hand to the right over the sling, grasping the rifle with the left hand so that the sling lies flat around the left wrist, the left hand being between the sling and the stock of the rifle. In putting the arm-loop on the left arm, be sure to thrust the left hand into the loop from the right side. If the hand is put into the loop from the left side, the sling will not lie flat around the left wrist, but will cut into the back of the hand and wrist, causing much discomfort when the sling is tightly adjusted.

In his excellent little book, "Suggestions to Military Riflemen," Lieutenant Townsend Whelen says:

"The gun sling should be used whenever it is possible to do so. It is even more of a factor in fine marksmanship than the wind gauge. By its use the rifle may be held absolutely steady; in rapid fire it facilitates the quick return of the rifle to the point of aim, and it takes up almost half of the recoil.

"The tension must come from the lower band, front attachment of the sling only."

"The sling must pass to the right of the left wrist to prevent canting, and thence around the left upper arm, preferably above the swelling of the triceps muscle."

"The portion of the sling between the loop and the lower swivel must be loose in all positions, as any tension here will cause the rifle to be canted to the right and will pull the butt away from the shoulder."

"The loop must be short enough to enable the rifleman to place a heavy pressure on the sling—equal, of course, for each shot. This is what is meant by holding hard, and it will cause the rifle to steady down like a rock and distribute the recoil to the entire body so the shoulder will scarcely feel anything."

"In rapid fire standing, the use of the sling takes up so much of the recoil that the rifle does not move off the target when firing or while working the bolt."

"Summing matters up, the advantages of using the gun sling are: absolute steadiness in the prone position; distribution of the recoil to the entire body; quickening return of the rifle to the target in magazine fire; preventing the rifle recoiling off the target; and minimizing the effect of the wind on the holding."

When first using the sling it will cause some inconvenience and discomfort if adjusted too tightly, but, after a little practice, it can be tightened gradually until it becomes a very effective aid.

Many riflemen have found that it is necessary to take measures to prevent the sling from slipping down the left arm. This is accomplished by sewing a piece of small-sized rope into the shirt sleeve above the elbow, thus making a ridge around the arm, which holds the sling up in its proper position.

CHAPTER SEVEN.

The Rear Sight and the Wind Gauge.

In order that the rifleman may accurately direct the barrel of the rifle, so that the bullet will strike the mark, front and rear sights are necessary; and as the shooting has to be done at different distances, the rear sight must be capable of adjustment, to allow the shooter to give differing angles of elevation to the barrel, to compensate for the drop of the bullet in its flight.

The greater the distance the rifleman is from the mark, the higher must the barrel be pointed into the air.

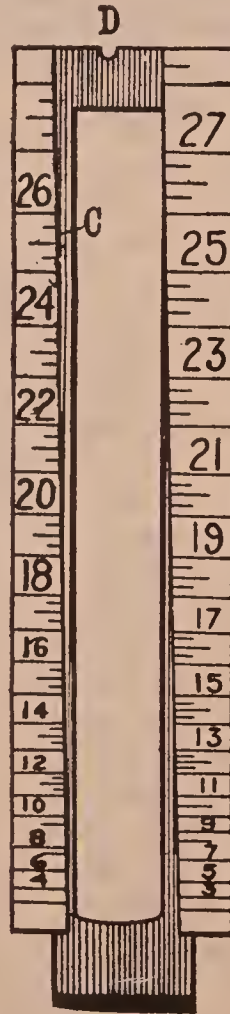


Fig. 26.

Elevating the rear sight causes the barrel to be inclined upwards when the shooter is aiming, and as a consequence of this elevation a higher point is struck by the bullet.

The leaf of the rear sight (Fig. 26) has the undercut for the drift slide (C) and the sighting notch (D). The lines extending across one or both branches of the leaf are 100-yard divisions, the short lines are 50-yard divisions, and the shorter lines are 25-yard divisions. The numbers on the uprights represent hundreds of yards and are on top of the lines which they indicate. For example; the 800-yard line is just underneath the figure 8.

With the leaf laid down, the sights are set for approximately 530 yards. This is known as the battle sight.



Fig. 27.

The drift slide (Fig. 27) has the peephole (A), the field view (B), and the sighting notches (D). It is attached between the slide (Fig. 29) and the slide cap (Fig. 28), and is moved up or down the leaf as required, being secured in the desired position by the slide binding screw (Fig. 32). The lines on either side of the peep and lower open notch enable the drift slide to be accurately set at any desired graduation on the leaf.

With the leaf up, ranges from 100 to 2350 yards can be obtained through the peephole, from 100 to 2450 yards through the open sighting notch at the bottom of the field view, and from 1400 to 2750 yards through the open sighting notch in the upper edge of the drift slide. The

2850-yard range is obtained through the open notch in the upper end of the leaf.

The drift slides are made with three different sizes of peep-holes, .04 inch, .05 inch and .06 inch, known as No. 4, No. 5, and No. 6 drift slides. The rifle as issued is equipped with a No. 5, drift slide, but one with a larger or smaller peephole can easily be substituted, as follows:

With the aid of a pin, drive out the small slide cap pin (Fig. 31), which is on the right-hand side of the slide cap (Fig. 28). Using a small screwdriver or knife-blade, remove the slide cap screw (Fig. 30), which is on the left side of the slide cap. The slide cap is next removed, by forcing it gently to the left and off the sight. The slide binding screw (Fig. 32) remains in place in the end of the slide (Fig. 29). The drift slide may now be moved up and off the leaf and another one put on to replace it. Use care not to drop the small slide cap pin, as it is easily lost.

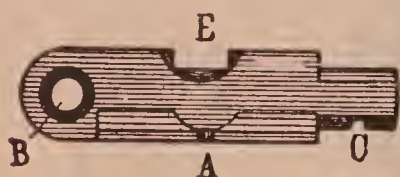


Fig. 28.



Fig. 29.



Fig. 30.



Fig. 31.



Fig. 32.,

When firing at a given range, if the rear sight is raised by an amount corresponding to 25 yards of range, or, in other words, if 25 yards more elevation is taken, the point where the bullet strikes the target is raised by a certain number of inches, varying according to the distance from the target. The following table shows approximately how much the point where the bullet strikes is

raised or lowered by a change of 25 yards in the sight setting:

Change in location of hit caused by changing elevation 25 yards.

Range.	Correction at Target.
200 yards.	2 inches.
300 "	3 "
400 "	4 "
500 "	6 "
600 "	9 "
700 "	12 "
800 "	15 "
900 "	20 "
1000 "	25 "

The Wind Gauge.

At the front end of the rear sight is a knob, called the windage screw knob, which when turned causes the movable base (Fig. 23) to pivot to the right or left. Moving this base is called "taking windage" and is referred to, as a motion of the wind gauge.



Fig. 33.

The rear end of the movable base bears wind gauge graduations, indicated by C on Fig. 33, the value of the smallest graduation being about 4 inches for each

100 yards of range. These smallest graduations are known as "points" of windage or deflection.

The following table shows the correction to the right or left caused at the target by taking one point of right or left windage:

Change in location of hit, to the right or left, caused by taking one point of right or left windage.

Range.	Correction at Target.
100 yards.	4 inches.
200 "	8 "
300 "	12 "
400 "	16 "
500 "	20 "
600 "	24 "
700 "	28 "
800 "	32 "
900 "	36 "
1000 "	40 "

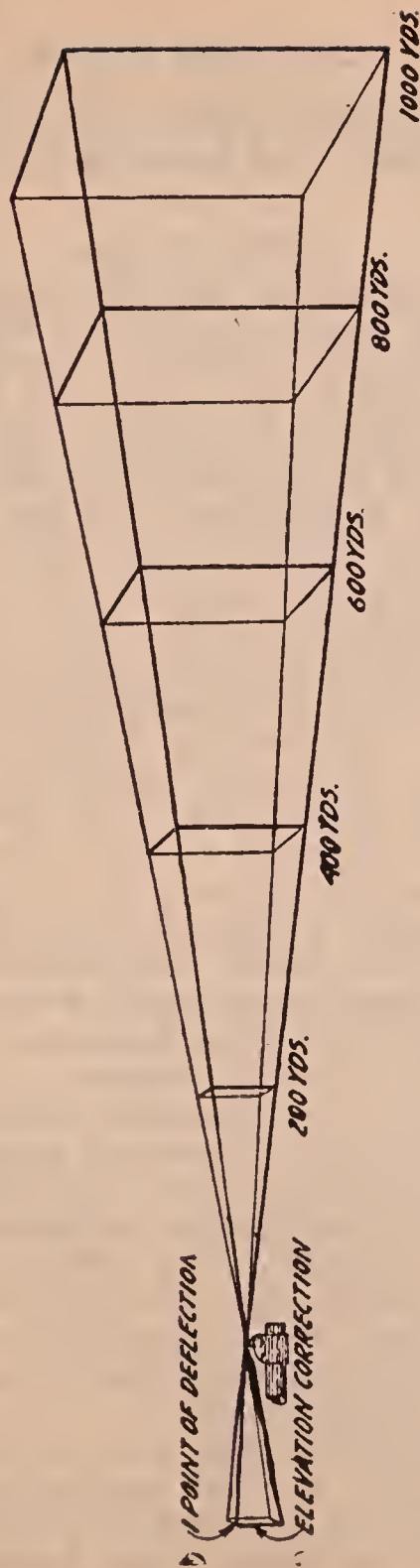


Fig. 40.

Illustrating how the value of any correction on the sight increases with the range. This applies both to windage and to elevations.

CHAPTER EIGHT.

Calling Shots.—Practice with the Rear Sight.—Short-Range, Mid-Range and Long-Range Targets.

Calling Shots.

It is vitally important that the rifleman should learn how to "call" his shots—that is, to be able to say just where the rifle was aimed at the moment of discharge, as no man will learn to shoot until he is able to do this.

In "calling" shots, the rifleman indicates, immediately after squeezing the trigger, the position where he expects the hit to be on the target. He must "call" his shot before it is signaled from the pit. If he is certain where he was aiming when the shot was fired, and the bullet did not strike in the place on the target where he "called" it and where he expected it to strike, then a correction must be made for the next shot before firing again.

For practice in designating different spots on the target as the points of aim of imaginary shots, fasten on the wall a full-size paper target, or use the diagrams on pages 66 to 71, drawing twelve lines on the target from the center of the bull's-eye to the edge of the target, each line representing a different position of the hour hand on the dial face of a clock from one to twelve o'clock, marking the lines with corresponding numbers; the twelve o'clock line being drawn from the center of the bull's-eye straight up to the top of the target.

Different points of aim are then indicated, the men describing the hold of the rifle at the moment of discharge as a "nine o'clock three," a "two o'clock four," and so on. Bear in mind that the rifleman, while endeavoring to aim at a point just underneath the bull's-eye, cannot always discharge his rifle with a perfect aim, and the call of the shot is not the point where he intended to aim, but the actual point on the target at which the sights were pointed when the rifle was discharged.

It is well to realize that when actually firing sometimes it is difficult to say just where the rifle was aimed when the trigger was squeezed, and on those occasions the rifleman must be honest with himself and with his

coach, and own up that he cannot "call" that particular shot. If the shooter cannot tell just how far off his aim was, but can tell the direction, he calls it a "four o'clock hold," or says, "I got off at 9 o'clock," as the case may be, without attempting to indicate how far out he was in the stated direction.

It must be remembered that if an actual shot is fired which is called a "nine o'clock three," for example (the rifle at the moment the trigger was squeezed having been aimed well to the left), and the shot is signaled from the pit as a center bull's-eye, a correction must be made for the succeeding shot, as otherwise that shot (if correctly aimed and held) will be well to the right of the bull's-eye. Many a man gets a bull's-eye from a poorly aimed shot, and, not realizing that his aim or hold was bad and not being able to "call" the position where he expected the hit to be, he makes no change of his sight, and finds that his succeeding shots, properly aimed and well held, do not hit the bull's-eye, and he is at a loss to account for the result.

It takes moral courage to change the sight after getting a "bull" from a poor hold, but it must be done.

Practice with the Rear Sight.

By the use of full-sized "A," "B," and "C" targets fastened to the wall, or the diagrams of targets on pages 66 to 71, the instructor can practice the men in adjusting the rear sight for elevation and windage. As an example, let it be supposed that with the sight set for 200 yards elevation and zero windage, a shot was fired at the "A" target at a range of 200 yards and that the bullet struck at the point marked "P," page 66; then the correction necessary to bring the next shot on the center of the bull's-eye is 75 yards less elevation and 2 points of left windage.

The instructor each time directs the rear sight to be adjusted at a certain elevation with a prescribed windage, and tells the men that they are supposed to be shooting at a designated range. The location of the imaginary hit is pointed out or marked with a lead pencil on the target. Each man then figures out the necessary changes in elevation and windage, using the tables on pages 59 and

60 and the information as to dimensions of targets on pages 64 and 65 in making his calculations, and sets his sight so that the next shot, if held the same, will hit the center of the bull's-eye.

This work is quite interesting to the men and of the greatest value, in that they become familiar with the amount of correction to be made at different ranges when shots have struck in various places on the target.

Accuracy and rapidity in the adjustment of the sights is desirable.

This practice also impresses the men with the importance of the marker in the pit placing the center of the marking disk over the shot hole, so that the firer can know the exact location of his hit on the target.

Short-Range, Mid-Range, and Long-Range Targets.

Target A.—The short-range target, used for 200 and 300 yards, is a rectangle 6 feet high by 4 feet wide.

Black circular bull's-eye, 8 inches in diameter; value of hit 5.

Center ring, 26 inches in diameter, 9 inches from edge of bull's-eye to the ring; value of hit 4.

Inner ring, 46 inches in diameter, 10 inches from center ring to inner ring; value of hit 3.

Outer, remainder of target, 1 inch on each side and 26 inches at middle of top and bottom from the inner ring; value of hit 2.

Target B.—The mid-range target, used for 500 and 600 yards, is a square 6 feet on a side.

Black circular bull's-eye, 20 inches in diameter; value of hit 5.

Center ring, 37 inches in diameter, $8\frac{1}{2}$ inches from edge of bull's eye to ring; value of hit 4.

Inner ring, 53 inches in diameter, 8 inches from center ring to inner ring; value of hit 3.

Outer, remainder of target, $9\frac{1}{2}$ inches from inner ring to the edge of the target at the center point of top, bottom and sides; value of hit 2.

Target C.—The long-range target, used for 800 and 1000 yards. It is a rectangle 6 feet high and 10 feet wide. (Was formerly 12 feet wide.)

Black circular bull's-eye, 36 inches in diameter; value of hit 5.

Center ring, 54 inches in diameter, 9 inches from edge of bull's-eye to the center ring; value of hit 4.

Inner ring, space outside of center ring bounded by vertical lines 2 feet from each end of the target; 9 inches from center ring to edge of inner space at middle point of top, bottom and sides; value of hit 3.

Outer, remainder of the target, being rectangle at each end, 2 feet wide and 6 feet high; value of hit 2.

TARGET "A" RANGE 200 YARDS

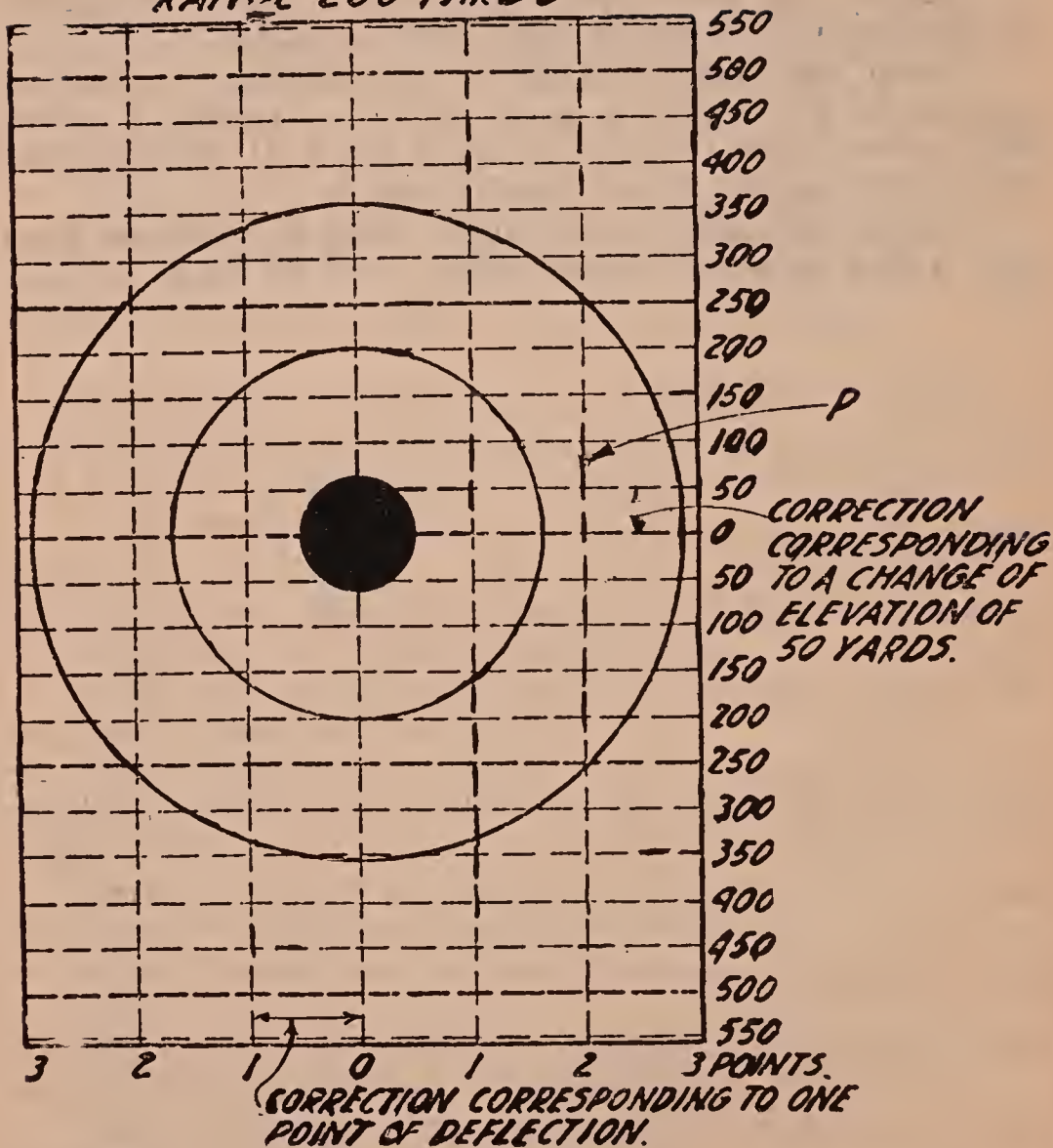


Fig. 34.

TARGET "A" RANGE 300 YARDS

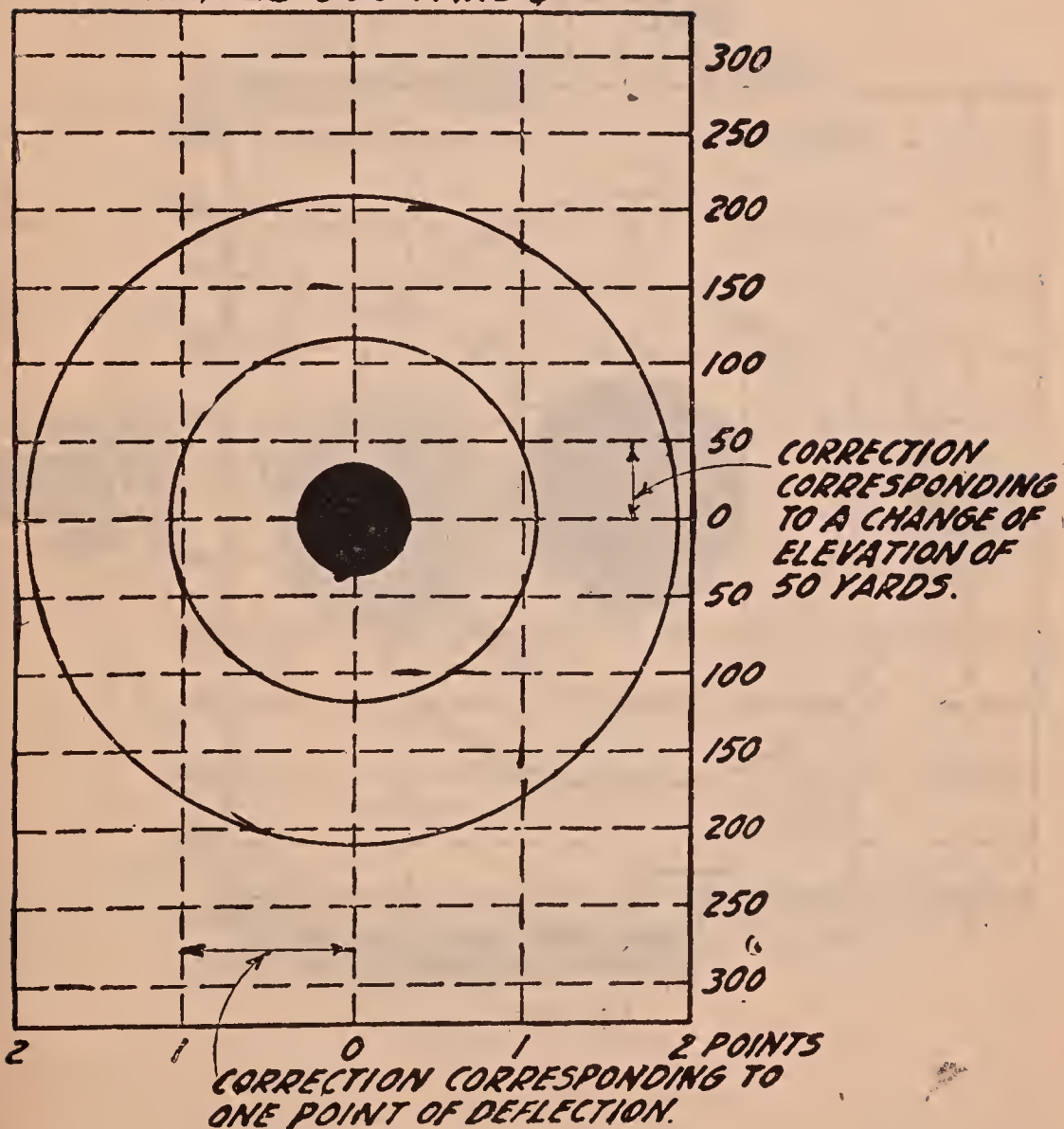


Fig. 35.

TARGET "B"
RANGE 500 YARDS

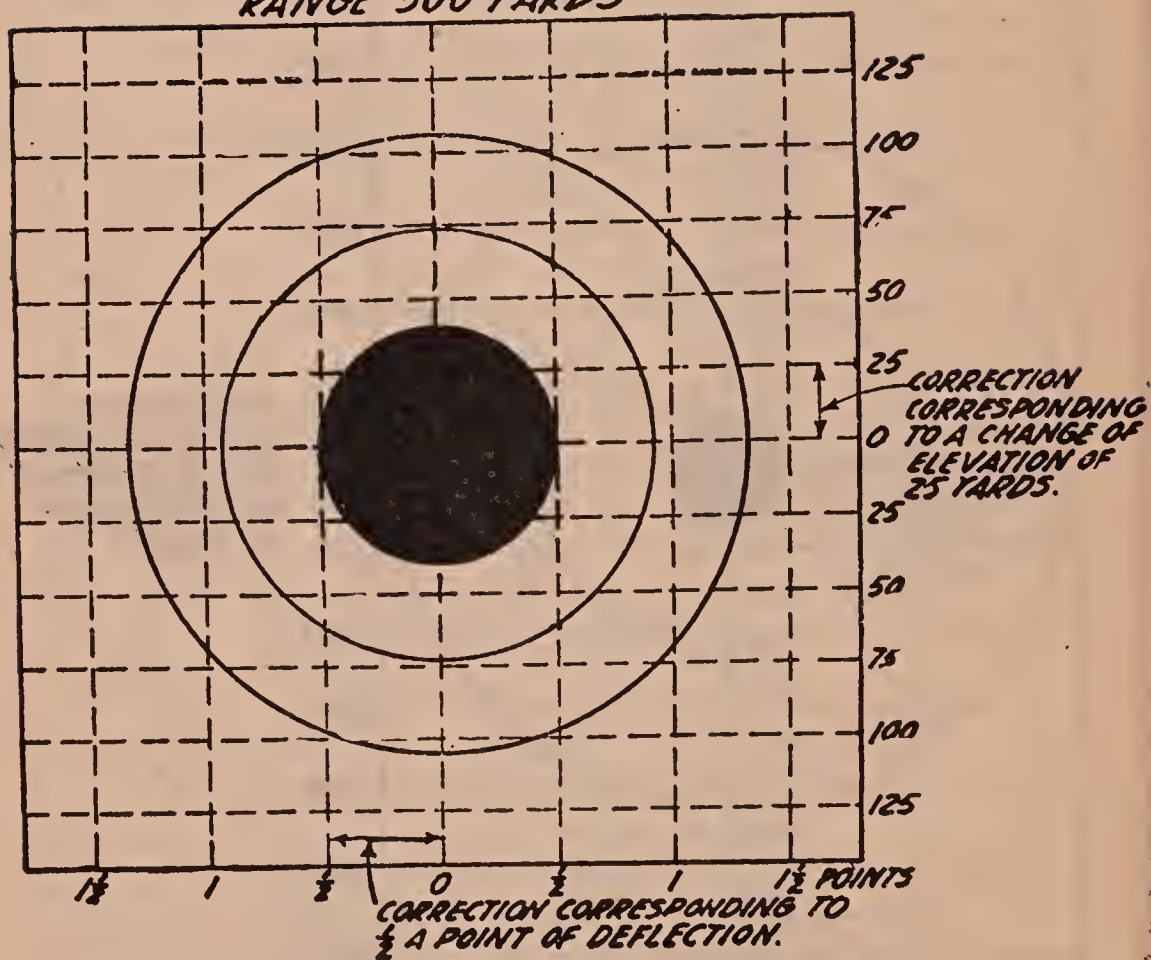


Fig. 36.

TARGET 'B'
RANGE 600 YARDS

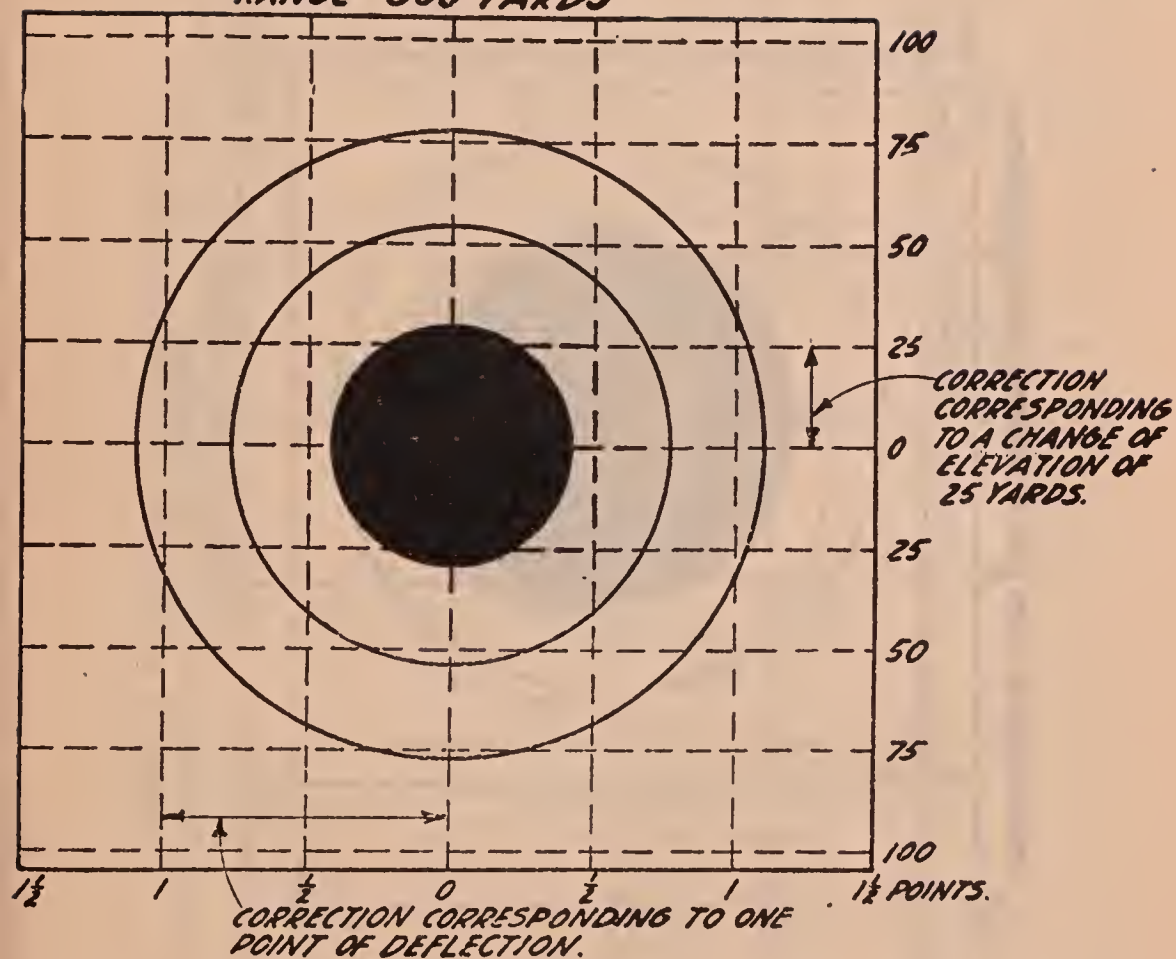


Fig. 37.

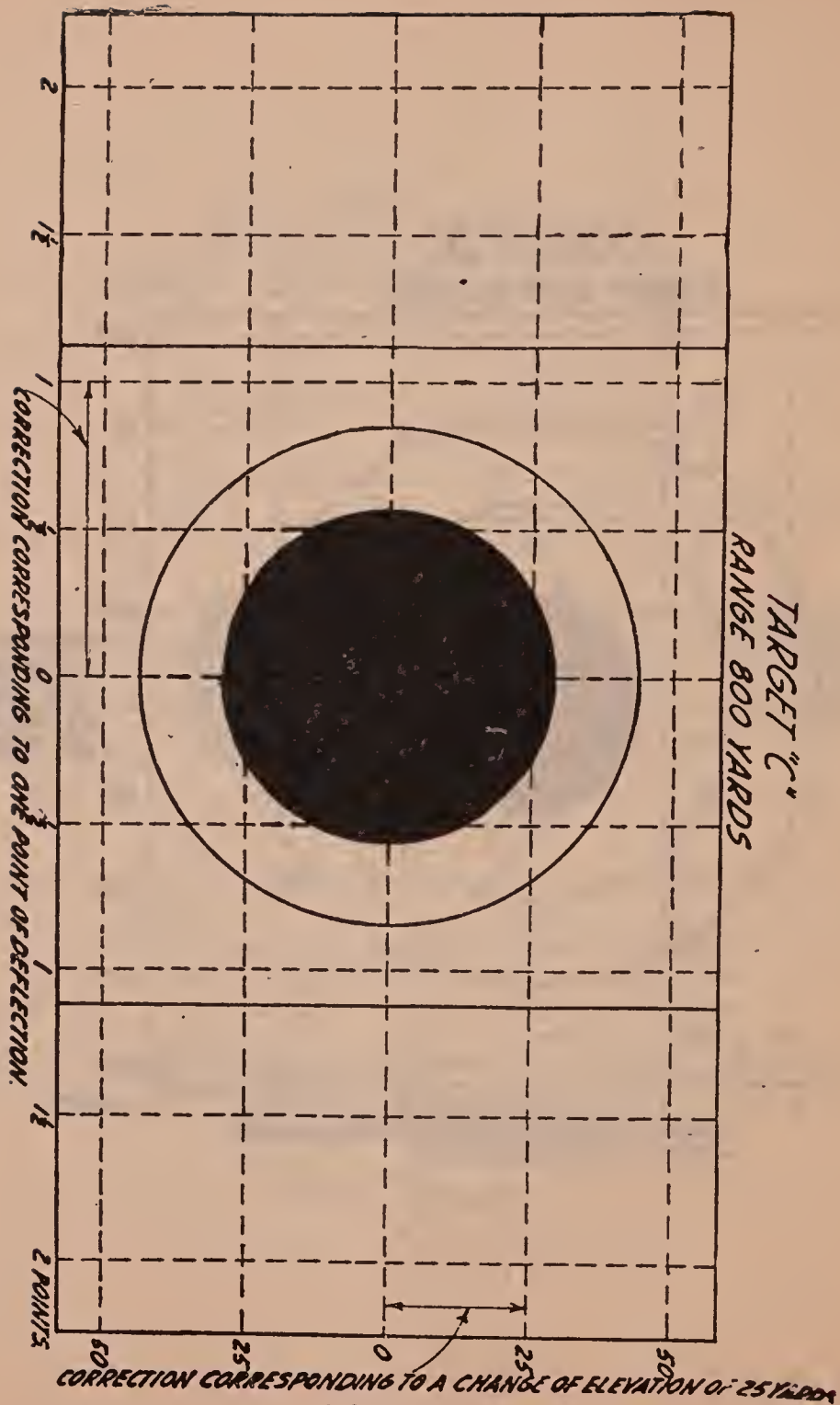


Fig. 38.

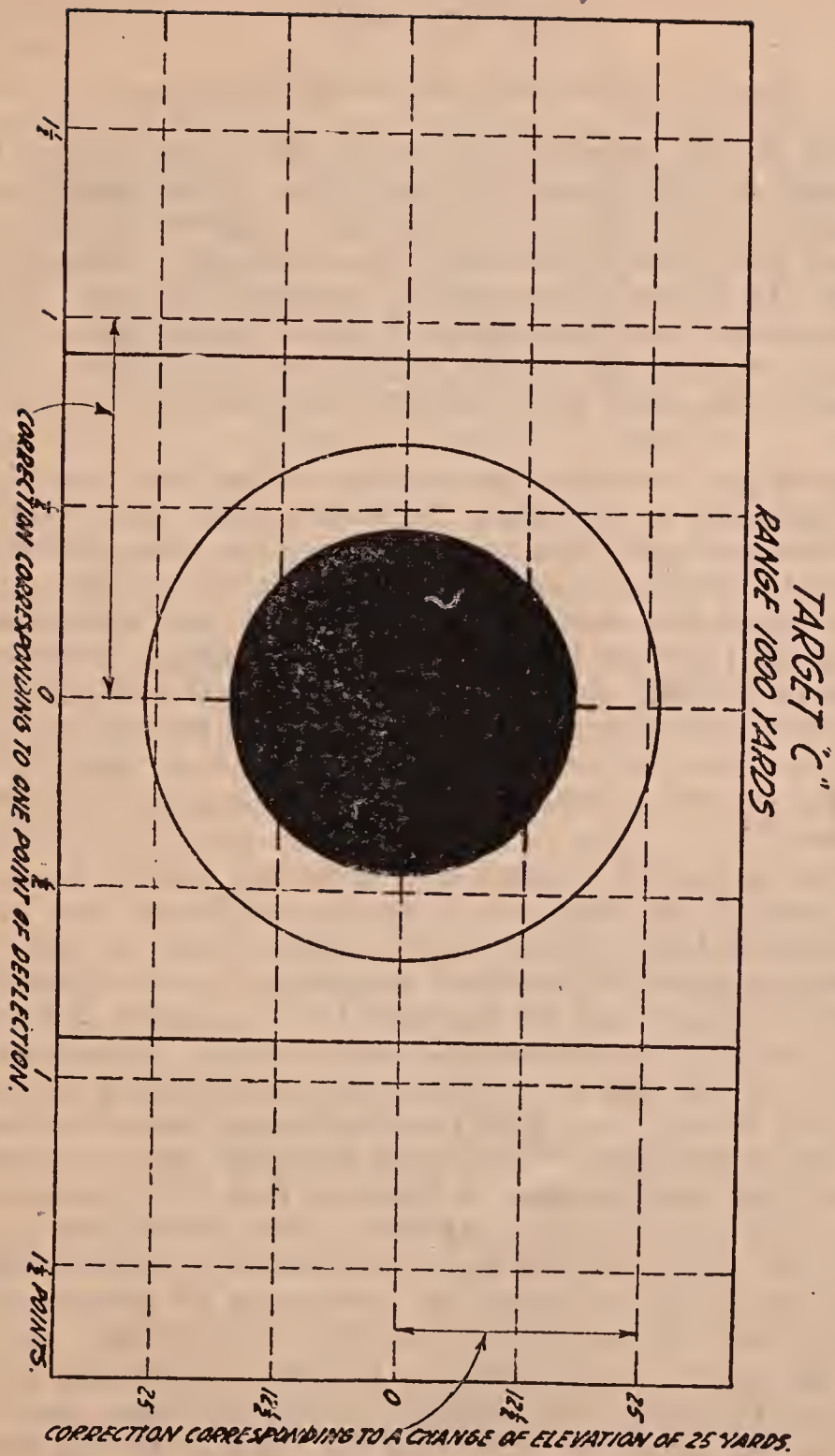


Fig. 39.

CHAPTER NINE.

The Zero of the Rifle.

One of the stumbling-blocks in the way of the tyro rifle shot is the "zero" of his rifle. This question of knowing his zero has caused many a shooter much anxiety, and since the battle sight has come into common use through its being prescribed for certain classes of fire, the question of zero has assumed double importance, owing to the fact that the battle sight zero is almost always different from what may be designated as the peep sight zero.

When the service rifle is targeted at the arsenal, an effort is made so to adjust the front sight that with the wind gauge set at nought a shot may be fired which, unaffected by weather conditions, will hit the center of the object aimed at, always providing that the elevation is correct and that the line of aim passes through the center of the rear sight and over the top of the front sight. Some rifles when received are found to be correctly adjusted in this respect, while many have a deviation to the right or left, which must be allowed for and constantly considered.

If on a perfectly calm day a proper aim is taken at an objective and the hit is to the right of the object aimed at and the same spot continues to be hit with consecutive shots, it becomes necessary to move the wind gauge sufficiently far to the left to counteract the cause which is responsible for the shot group being to the right. The amount of windage thus necessarily taken to bring the shot group into the center of the objective is the zero of the rifle. Thus if it is found that a point of left windage is necessary, the zero of that rifle is one point left. If on the contrary, the shot group is at first to the left of the objective and say a half point of right windage has to be taken to bring the group to its proper place, then the zero of the rifle is one-half point right.

This zero is independent of weather conditions, is constant for the same gun when used by the same man, and remains the same at the different ranges, if the aim is

taken always in the same manner and unaffected by light changes.

An inexperienced shot who does not appreciate the importance of knowing the zero of one's rifle generally finds it difficult to understand why he has to take different windage from that which some other man is using when shooting under identical conditions of weather. One man in a pair shooting side by side may be getting "bulls" with a point of left windage while his partner finds he needs two points. The inexperienced one will be heard to say, "I don't know how it is that he needs only one point while I need two." The reason is perfectly apparent to one who understands how different rifles have different zeros. If the rifle of the first man had a half point left zero, then he was really using but half a point of left windage to counteract the effect of the wind which was blowing at the time. As his partner needed two points of left windage on the scale where the wind called for but half a point, then the latter's zero was a point and a half left, and on a day when there was no wind blowing he would need that point and a half to bring his shots into the center of the bull's-eye.

To find the zero of a rifle, select a day when weather conditions are not changing and there is no apparent movement of the air. Do the shooting in the prone position at 200 yards, firing each shot with the greatest possible care. Use a target with a painted black cross substituted for the bull's-eye, the vertical and horizontal lines of the cross to be 2 inches in width, corresponding to one-quarter of a point of windage at 200 yards. Aim to hit the point where the two lines of the cross intersect. After each shot have the marker place a small "spotter" or shot mark in the hole made by the bullet, so that the exact spot where the shot hit the target may be seen by the firer. White spotters should be used in holes made in the black cross and black spotters on the light part of the target. If necessary, use a field-glass to locate the spotters. After finding the peep sight zero, the process should be repeated for the zero of the battle sight. It may take several days of this kind of practice for the shooter to become confident that he has ascertained the

correct zero of his rifle, but no successful work can be accomplished on the range until the zero is definitely and positively known to the man who shoots the gun.

When men are shooting in pairs, it is possible to ascertain their comparative zeros fairly accurately, even though shooting in a wind and unable to practice on a calm day. If No. 1 finds that he gets center bull's-eyes with two points of right windage while No. 2 under the same conditions needs three points right, it shows that their zeros are one point apart, and the same difference will be found to exist in all their subsequent practice, no matter from which quarter the wind may be blowing. If on the following day No. 1 finds the bull's-eye using a point of left windage, then No. 2 may set his wind gauge at nought and go ahead with confidence that he is all right so far as lateral deviation is concerned. After a few days' practice, it can be determined reasonably correctly just how this difference of a point is to be divided, whether one man's zero is one-quarter right and the other's zero is one and one-quarter right, or whether one has a zero of one-half left and the other a zero of one-half right, and so on.

After a rifle has been fired a few hundred times and has settled down, it is not believed that the zero changes until the rifle is shot out—that is, until the bore of the rifle becomes so worn as to cause inaccuracy; and when that time comes, there is no use in hunting for a lost zero, as the rifle has outlived its period of usefulness as an arm of accuracy. It is thought that reported changes of zero in accurate-shooting rifles are due to some causes over which the shooter has control or to unappreciated conditions which do not constantly affect the rifle in the same manner.

A change in the manner of aiming may result in what is charged up to the rifle's changing zero, while as a matter of fact the unexpected location of the hit is due to the firer and not to the rifle. A man who at the beginning of his shooting persistently aims incorrectly, with a constant error, such as seeing his front sight to one side of the aperture of his rear sight, may after a while change to a correct method of aiming, with a resultant necessary

change in his zero. A constant cant of the piece when corrected will operate in the same manner, and these errors, which are often corrected without a realization on the part of the shooter that they had existed, naturally cause a belief that the rifle has changed its zero; which of course it has, so far as that particular man and his method of aiming are concerned, but not due to any change in the rifle itself.

Unnoticed conditions very frequently occur which are responsible for erratic results, thought by the firer to be due to a change of zero; these results being most perplexing and disheartening unless the cause is realized and allowances made to offset it. Under this head come the effect of light when striking the sights at an angle different from usual, a rubbing of the black from one side of the front sight, or shooting without a front sight cover when accustomed to using one, any of which will cause disastrous results.

All windage for counteraction of conditions is taken from the known and proven zero. If a man has learned that his zero is a half point left and the coach tells him to take a point of left windage, the shooter must add that point to the half point known to be his zero, which would result in his wind gauge reading on the scale one and one-half points left. If, on the other hand, the coach told him to take a point of right windage, he must still consider that with his wind gauge set at one-half left he has no windage and to take a point of right windage he must move his wind gauge one point to the right of its known zero position; that is, moving it to nought on the scale gives him a half point right windage and moving it another half point to the right gives him one point of right windage from his zero, although on the scale the wind gauge reads one-half point right.

The coach tells the shooter the amount of windage necessary to be taken on account of conditions which obtain at the time, and each man has to make his own calculations for the proper setting of the wind gauge on the rifle with which he is firing.

CHAPTER TEN.

Normal Elevations.—Factors Which Influence Elevations.

The bore of the United States Rifle is drilled, reamed, straightened and rifled with the utmost of mechanical and personal skill, and the barrel is finally stocked and targeted in order to test its actual shooting qualities.

Great care is taken in the manufacture of the rifle to insure its uniformity and excellence, but so many variables enter into the shooting of a rifle that a certain amount of deviation from the average inevitably results.

Each rifleman has to determine for himself the normal elevation of his rifle for each range. By normal elevation is meant the elevation required on a day when average weather conditions prevail.

To find the normal elevation, select a warm day, not too hot, when the sun is shining and there is little, if any, wind blowing. Begin in the prone position at 200 yards, firing each shot with the greatest possible care. Use a target with a painted black cross substituted for the bull's-eye, the vertical and horizontal lines of the cross to be 2 inches in width, corresponding to a change of elevation of 25 yards at the 200-yard range. Aim to hit the point where the two lines of the cross intersect. After each shot have the marker place a small "spotter" or shot mark in the hole made by the bullet, so that the exact spot where the shot hit the target may be seen by the firer. White spotters should be used in holes made in the black cross and black spotters on the light part of the target. If necessary, use a field-glass to locate the spotters.

When shooting at the 200-yard range, if it is found necessary to set the rear sight at say 275 yards, then the normal elevation of that particular rifle for the man who is shooting it is 275 yards for the 200-yard range.

Having ascertained the normal elevation for 200 yards, proceed in the same manner for the other ranges, except that a bull's-eye target is used, as the cross cannot be seen sufficiently well at the longer ranges.

Varying conditions of weather on different days will necessitate raising or lowering the sights from the normal

elevations, but the latter are the basis of all calculations.

Men can help each other quickly in regard to elevations when each one knows his own normal elevation. Suppose on a certain day, when shooting at 600 yards, the first man to fire, whose normal elevation for that range is say 550 yards, finds that he must use 575 yards elevation to get hits in the center of the bull's-eye. That means that an increased elevation of 25 yards over the normal is needed. The next man to fire, whose normal elevation at that range is say 650 yards, is told that 25 yards more elevation is required, so he sets his rear sight for 675 yards and goes ahead. If they did not know their normal elevations and the first man told the second that 575 yards was the correct elevation, it can readily be seen that such information would be of little use to the second man, who would get no satisfactory results from using such an elevation.

There are numerous conditions which are apt to affect the elevations. Among the most important are the following:

The temperature has a marked effect on the elevation. On a hot day the air is likely to be thinner, thus offering less resistance to the passage of the bullet and necessitating a lowering of elevation; while on a cool day the reverse is true. It has been estimated that a change of temperature amounting to $7\frac{1}{2}$ degrees will cause a difference in the point struck on the target amounting to 1 inch for each 100 yards of range. Thus, if firing to-day at 1000 yards, with a temperature as indicated by the thermometer of 70 degrees, and to-morrow at the same range, but with a temperature of 85 degrees, the shots of tomorrow would go 20 inches higher on the target than to-day's shots, always providing that other conditions remain unchanged.

There seems to be no reason why changes in light should require changes in elevation if care is used always to aim in the same manner. As a matter of fact, few men are able to aim in the same way when the target is in shadow as they do when it is in the bright sunlight. On a bright, sunshiny day it is comparatively easy to aim just under the bull's-eye, with a narrow streak of white showing

between the black bull's-eye and the black front sight. When a cloud passes between the sun and the target, casting a shadow upon the target, this streak of white is generally made wider by the shooter without his realizing it, thus making his aim lower on the target than before. To counteract this difference in aim, he finds it necessary to raise his elevation. On the other hand, if he is shooting on a cloudy day and the sun comes out between shots, giving him a bright target to aim at, he unconsciously aims closer to the bull's-eye and must lower his elevation in order to avoid high shots. For most men it is found then that a dark target requires more elevation and a bright target less elevation. This is not true, however, for all men, and some find that a dark target causes them to aim up into the black and lower elevations are necessary, while with a bright target they see the streak of white and so must raise the elevation. Other men are able to aim in the same manner in different lights and find that no change of elevation is necessary on account of changing light.

When using the peep sight, changes of light on the sights have little, if any, effect on the elevations; but with the open sight a shadow cast upon the rear sight generally results in a tendency to see more of the front sight than usual, and lower elevations must be taken. If shooting on a dark day and the sun comes out between shots and illuminates the sights, the shooter, without being conscious of the fact, sees less of his front sight than before, and so must raise his elevations. For most men, then, a bright sight requires more elevation and a dark sight less elevation. Some men, however, find that light on the sight affects them in the opposite way, and others, by being able to aim always in the same way, learn that the changes of light on their sights do not affect their elevations at all.

The only safe method to pursue, so far as effect of light on elevations is concerned, is for each man to determine for himself, by practice in changing lights, and on dark and sunny days, just how he is affected and what

corrections in elevations he must make to counteract such effect.

On rainy or damp days, the moisture in the air has a tendency to soften the fouling in the bore of the rifle. When this fouling is soft it is easier for the bullet to pass through it. As any influence which lessens the resistance to the passage of the bullet from powder to target results in a less curved path for the bullet, the presence of moisture in the air will render lower elevations necessary.

The heating of the barrel of the rifle, due to rapid firing, will cause a change in the point struck, the shots going higher as the barrel becomes heated. The first shot from a cool, clean barrel usually goes higher than the succeeding group, the second shot generally dropping somewhat. If the rifle becomes very hot, the shots will go higher and less elevation must be taken.

Ammunition which has a high initial velocity requires lower elevation than ammunition of low velocity. This will be readily understood when it is remembered that a bullet with high initial velocity travels faster, and consequently with a flatter trajectory, than one with a lower initial velocity. The bandoleer or the box which contains the cartridges has marked upon it the initial velocity of the cartridges. As different velocities require different elevations, a record should be kept of the velocity used each time when firing. These differences, while slight, should be borne in mind.

The effect of wind on elevations is so slight at the short ranges that it may be disregarded, but at the longer ranges it must be taken into consideration. A wind blowing from 12 o'clock has a retarding effect on the bullet, while a 6 o'clock wind accelerates the bullet's flight. Or, to put it in another way, a wind blowing up the range from the target toward the firing point lowers the point where the bullet strikes the target, and a wind blowing down the range from the shooter to his mark raises the position of the hit.

The following table shows the effects on elevations of 12 or 6 o'clock winds blowing 10 miles per hour:

Corrections in Elevations for a 10-Mile-an-Hour Wind.

6 o'Clock Wind.

12 o'Clock Wind.

Range.	Amount Shot will go High			Amount Shot will go Low		
	if not Corrected.	Sight to be Lowered.		if not Corrected.	Sight to be Raised.	
100 yards	.03 inches	1.0 yards		.02 inches	0.9 yards	
200 "	.12 "	2.0 "		.11 "	2.0 "	
300 "	.41 "	3.2 "		.40 "	3.2 "	
400 "	.69 "	4.5 "		.68 "	4.4 "	
500 "	1.4 "	6.1 "		1.3 "	6.0 "	
600 "	2.5 "	8.0 "		2.4 "	8.0 "	
700 "	4.4 "	10.2 "		4.3 "	9.9 "	
800 "	7.8 "	13.6 "		7.6 "	13.3 "	
900 "	14.7 "	19.9 "		14.1 "	19.0 "	
1000 "	25.1 "	26.7 "		23.9 "	25.5 "	

For other wind velocities, the corrections may be readily computed without appreciable error by assuming that these corrections are directly proportional to the wind velocities. The effect on elevations of winds blowing from 1, 5, 7, and 11 o'clock and necessary corrections may be found by multiplying the figures in the above table by .866. For winds blowing from 2, 4, 8, and 10 o'clock, divide the figures in the above table by 2.

CHAPTER ELEVEN.

Designation and Deflecting Effect of Winds.—Judging the Wind.

Designation of Winds.

To understand how the wind, blowing from a certain direction, is referred to, let the rifleman imagine himself standing in the center of the dial face of a large clock which is lying on the ground with the 12 toward the target, the 6 behind him, the 3 directly to his right and the 9 directly to his left.

When the wind is spoken of as a 12-o'clock wind, it will be a wind blowing from the direction of the 12. A 6-o'clock wind will be one which comes from behind the firing point, blowing directly down the range toward the target. A 3-o'clock wind is one blowing directly from right to left; and so on. A 2-o'clock wind comes from the direction of the 2 on the imaginary dial and blows diagonally across the range toward the 8 of the dial, while an 8-o'clock wind is just the reverse.

By placing the large paper target, ruled and marked as described on page 62, on the ground or floor, pointing the 12 in the direction in which the target is supposed to be and standing upon the bull's-eye facing the 12, each man may practice calling imaginary winds considered to be blowing from various directions.

The strength, or force, of the wind is referred to in miles per hour; thus, a wind which is blowing at the rate of 16 miles an hour is called a 16-mile wind.

Deflecting Effect of Winds.

Wind affects the motion of the bullet by deflecting it to the right or left and by retarding or accelerating its progress toward the objective.

The deflecting effect is the more important as the bullet is blown to one side on its way to the target, and unless the wind gauge is moved sufficiently to counteract this effect of the wind, the bullet will strike a distance to the right or left of the mark, depending upon the direction and strength of the wind.

The following table shows the deflection of the bullet caused by a wind blowing at the rate of 1 mile an hour

directly across the range from the right or the left—that is, a 3-o'clock or 9-o'clock wind:

Deflecting Effect of a 1-Mile Wind, from 3 or 9 o'Clock.

Range.	Deflection.
100 yards	.1 inches
200 "	.3 "
300 "	.8 "
400 "	1.5 "
500 "	2.4 "
600 "	3.6 "
700 "	5.1 "
800 "	6.9 "
900 "	9.1 "
1000 "	11.5 "

If a wind blows from the 2, 4, 8 or 10 o'clock directions, the resulting deflections are less than when it blows directly across the range, and to obtain the deflections caused by such winds the deflections in the above table are multiplied by .866. To obtain the deflections resulting from a wind blowing from 1, 5, 7 or 11 o'clock, divide the deflections in the table by 2.

The deflection caused by a wind of any strength can be readily ascertained by multiplying the figures in the table by the strength of the wind expressed in miles per hour. For example, if shooting at the 600-yard range, a 10-mile wind from 3-o'clock would blow the bullet 36 inches to the left. As the target is 72 inches in width, if no correction were made by moving the wind gauge, the bullet, instead of striking the center of the bull's-eye, would just hit or miss the left-hand edge of the target. If the wind was of the same strength, but from say 1 o'clock, the bullet would be blown only half the distance, or 18 inches.

To counteract the deflecting effect of the wind on the bullet, a certain number of points of windage must be taken on the wind gauge. The following table shows how many points of windage must be used at the various

ranges for a 10-miles-an-hour wind from each of the various directions:

Points of Windage Necessary to Correct a 10-Miles-an-Hour Wind.

Range.	3 or 9 o'Clock.	2, 4, 8 or 10 o'Clock.	1, 5, 7 or 11 o'Clock.
100 yards	0.2 points	0.2 points	0.1 points
200 "	0.4 "	0.4 "	0.2 "
300 "	0.7 "	0.6 "	0.3 "
400 "	0.9 "	0.8 "	0.5 "
500 "	1.2 "	1.0 "	0.6 "
600 "	1.5 "	1.3 "	0.7 "
700 "	1.8 "	1.6 "	0.9 "
800 "	2.2 "	1.9 "	1.1 "
900 "	2.5 "	2.2 "	1.3 "
1000 "	2.8 "	2.4 "	1.4 "

Since the deflecting power of a wind is directly proportional to its velocity, the proper corrections for any velocity of wind may be readily computed from the above table.

Winds blowing from the 12 and 6 o'clock directions have no deflecting effect on the bullet, their only effect being to retard or accelerate its flight.

Judging the Wind.

The force and direction of the wind must be studied, in order that proper allowances may be made to offset its effects on the bullet; the ability to properly judge wind being of the greatest value to a rifleman.

Movements of flags or streamers assist the firer in estimating the strength of the wind and in giving him the necessary information as to its direction. In the absence of such aids he will find that a handful of grass thrown into the air will help him, but the most reliable guide of all is mirage when it is present and can be seen.

There is usually moisture in the ground, and when the heat of the sun acts on this moisture it causes what is known as mirage, the effect being that of heat waves or ripples, which can be seen flowing with the wind across

the face of the target. As Hudson says: "In observing the mirage through a telescope trained on the target, we practically see the movement of the air through which the bullet must pass in its flight."

Mirage causes the bull's-eye and target to have a wavy and ill-defined appearance. When there is no wind blowing the mirage moves straight upwards from the ground and is said to be "boiling." The slightest movement of the air affects the mirage, which is of the greatest assistance in showing the force of the wind and its direction, especially when the wind is puffy or changing in strength.

To observe mirage to the best advantage, a telescope is necessary; but even with the naked eye much help will be derived from a close observation of the mirage.

The mirage will indicate a change in the wind before the flags do, but do not neglect to watch the flags, if there are any, at every shot. The flag nearest the target is the most important, as it shows the wind which has the most effect on the bullet.

When shooting in a gusty or "fishtail" wind—that is, one which is switching from one direction to another, the effort should be made to fire each shot under the same conditions.

If in any doubt about a change of wind, make a sufficient change in the windage to stay in the bull's-eye in case there should be no real change.

Persistent practice in judging winds, and careful observation of their effects on the bullet, will soon result in the rifleman becoming quite skillful in estimating the allowances which must be made.

CHAPTER TWELVE.

Cleaning the Rifle after Firing.

As the bore of the rifle is manufactured with great care in order that a high degree of accuracy may be obtained, it should be kept in as perfect condition as possible.

The residuum from smokeless powder, which tends to corrode the bore, and a deposit of metallic fouling, have both to be removed.

The bore must be cleaned as soon after firing as practicable. Cleaning between scores or between ranges, while permitted, is not necessary.

First use patches saturated with Hoppe's Powder Solvent No. 9, to remove powder fouling. Then wipe dry.

A solution known as the "Ammonia Solution" gives the best results in removing the metallic fouling. The solution is mixed in the following proportions: 1 ounce of ammonium persulphate, 200 grains of ammonium carbonate, 6 ounces of stronger ammonia containing 28 per cent of ammonia gas, and 4 ounces of water.

If no scales are available for weighing the ingredients, they may be measured, and the equivalents are as follows:

1 ounce of ammonium persulphate equals about one medium heaping spoonful.

200 grains of ammonium carbonate equal one medium heaping spoonful.

6 ounces of ammonia (28 per cent) equal three-eighths of a pint.

4 ounces of water equal one-fourth of a pint.

The spoon referred to is the spoon issued by the Ordnance Department of the Army for the mess outfit.

Only enough solution should be mixed to last a few days. Keep it in a bottle with a rubber cork. Exact proportions are not of great importance and a small quantity can be mixed without accurately weighing or measuring the ingredients.

Powder the persulphate and carbonate separately. Dissolve the persulphate in the ammonia and the carbonate in

the water and then pour the mixture in a strong bottle, and cork. The solution may be used in an hour.

To use the solution, take the bolt out of the rifle, wipe out the breech, and plug up the chamber with a rubber cork which has a string tied around its larger end, so that it may be readily removed. See that the cork is tight in the chamber. Place a 2-inch piece of rubber tubing on the muzzle of the rifle, so that the solution will cover the muzzle. Pour the solution into the muzzle until the barrel is filled and the solution is part way up the rubber tubing. A small-sized measuring glass is very convenient for use in putting the solution into the barrel of the rifle.

The solution will foam at the muzzle immediately after the barrel is filled. Be careful not to spill the solution on the outside of the rifle. Stand the rifle in a place where there is no danger of it falling down and let the solution remain in the bore for not more than 10 minutes.

Pour the solution from the barrel and place it in another bottle. When pouring it out it will be dark blue in color and the metal fouling will have been dissolved. The same solution should be used not more than twice, but after it has been once used it should not be mixed with any unused solution. This solution is expensive and ought to be used economically.

Remove the rubber tubing and pull the cork out of the chamber by aid of the string. The cork may be removed by inserting the cleaning rod carefully from the muzzle, but the other method is better. Never place the cleaning rod in the muzzle end of the rifle if it can be avoided.

Rest the muzzle on a piece of soft wood on the floor or ground; place a patch of Canton flannel or outing flannel in the breech and with the long brass cleaning rod push the patch completely through the bore and out at the muzzle. Then use other patches until the barrel is per-

fectly dry, working the rod, with a patch on the end of it, up and down the bore.

Do not use thin cloth, as the end of the rod will tear through the patch, which will catch in the bore and be difficult to remove.

Great care must be taken to remove the solution from all metal parts of the rifle, as it may start rusting in a very short time.

Clean the muzzle, inspect the bore to see that it is clean and bright, and then use a patch saturated with Hoppe's Powder Solvent No. 9, pushing the patch back and forth through the bore with the cleaning rod. Allow the Powder Solvent to remain in the bore when the rifle is not in use. If No. 9 is not available, use Three-in-One Oil.

If the rifle is not used every day, it should be cleaned daily for a few days, as it has been found that the powder gases are probably forced into the texture of the steel and will, if additional cleanings are not resorted to, cause rusting, no matter how thoroughly the bore may have been cleaned at first.

If a cleaning rod is not at hand, the barrel should be cleaned as thoroughly as possible by means of the thong brush and rags. To clean or oil the bore with rags, the thong brush is unscrewed, the rag placed in the rag slot of the thong tip and drawn from the muzzle toward the breech.

When the rifle is to be laid away or not used, a light coating of cosmo'ine or cosmic oil should be used on the bore and chamber, after all fouling is certainly removed.

CHAPTER THIRTEEN.

Exercise and Care of Health.—Equipment and Accessories.—The Score Book.

Exercise and Care of Health.

A successful rifleman must be in excellent physical condition. A regular course of training is not practicable for most men, nor is it necessary, but the man who expects to shoot well must observe the rules for health and keep himself in trim.

Take as much exercise out of doors as possible, and each morning before breakfast go through some brisk strenuous exercises to get rid of muscular nervousness.

Do not eat food which is not easily digested; eat moderately of wholesome food, avoiding an over-loading of the stomach, and keep the bowels acting regularly.

Be sure to get regular sleep each night and plenty of it. No one can remain up late at night and be in condition to shoot his best the next day.

Excessive smoking is injurious to the heart and the eyes. It is better to quit smoking during the practice season, but at least tobacco should be used in moderation.

Do not drink intoxicating liquor of any kind in any quantity,

Coffee is a stimulant and it should not be used.

Take care of the eyes and avoid straining them by reading in poor light or when on moving vehicles. Never read when lying down and do not use the eyes to excess in artificial light. Amber-colored glasses are excellent to protect the eyes in a strong sunlight, but most men find that the glasses should be removed a few minutes before beginning to shoot.

Equipment and Accessories.

The clothing worn when shooting should be comfortable and pads sewed on the elbows and right shoulder of the coat or shirt are very desirable. The collar of the coat or shirt must be loose.

Some of the articles needed in cleaning and caring for the rifle have been referred to. They include a long

brass cleaning rod, rags, Canton flannel or outing flannel for patches, a pair of scissors, a pocket knife, gasoline, ammonia solution, Hoppe's Powder Solvent No. 9, Three-in-One oil, oiler, cosmoline or cosmic oil, a block of wood on which to rest the muzzle of the rifle, a rubber cork with string attached for the breech, a short piece of rubber tubing, some soft wood sticks and toothpicks, a measuring glass, a screwdriver, some gum camphor and matches.

In the butt of the rifle an opening is provided for holding the oiler and thong case, which should always be carried in the rifle available for use. The leather-tipped cap on the oiler and thong case should be next to the butt plate cap. In the oiler a small supply of oil for lubrication of the working parts of the rifle is carried and the thong and brush are placed in their compartment at the other end of the case.

Have a small satchel or bag for use as a "dope bag," in which to carry the small articles that are needed on the range. It should have a long strap on it, so that it may be slung over the shoulder.

Carry a score book and pencil to the firing point and record every shot fired. Make a note of the weather conditions, including the wind, light and temperature, and show the elevation and windage used for each shot. Most score books have a target printed on each page on which the position of each hit can be marked. The Bull's-eye Score Book by Major Johnston is an excellent one and contains full instructions for properly scoring all shots fired. The use of a score book when shooting at targets is absolutely necessary if any progress is to be made.

A watch is very convenient to have, and a small thermometer, while not a necessity, will help in estimating the changes in elevation made necessary by different temperatures.

Marble's jointed rifle rod is a good and convenient rod to carry in the "dope bag" for use in case of emergency. It is No. 9728, .28 to .35 caliber, 32-inch, made

of brass with a steel core, and can be procured from the Marble Safety Axe Company, Gladstone, Michigan.

Use a rifle rest which can be stuck into the ground, upon which to place the rifle when not firing. It prevents the rifle from being injured, keeps the muzzle up off the ground so that dirt does not get into it, and the stock is protected from the moisture of the earth. A forked stick will answer the purpose if nothing better is available. An excellent and cheap rifle rest can be procured from Thomas J. Conroy, 28 John Street, New York.

The Elliott ear-protectors are a great comfort when firing, especially at rapid fire, Cotton may be used in the ears if it is preferred.

To prevent slipping, use powdered rosin on the elbows and right shoulder of the shirt or coat, and also on the knees of the breeches when firing in the kneeling or sitting positions.

The front sight cover is to be kept on at all times when not actually firing. Whether it is used or not when firing is a matter for each individual to decide for himself. It protects the front sight from injury, prevents the blackening being rubbed from the sight, lessens the effect of the changes of light when shooting; some shooters find it valuable as a check on centering the front sight in the peep sight, and some use it as an aid in aiming during rapid fire with the battle sight when it is necessary to aim below the figure at the short ranges. The front sight cover should not be kept on when shooting if a large-sized peep sight, such as a No. 6, is used, as the top of the sight cover is then visible through the peep sight and a false idea of the center of the peep sight is apt to be conveyed to the shooter.

Several patterns of front sight covers to protect the muzzle and front sight when the rifle is not in use are manufactured and it is very advisable to have one and keep it on when not firing. These not only protect the sight itself, but guard the muzzle from injury and assist in preventing rust in the bore.

Covers for the rear sight can also be procured and the use of one will help to protect the rear sight against accidental damage and will also protect the blackening,

which is likely to be rubbed off on the way to the range or during the intervals between scores.

The most expert riflemen use a small telescope on the range, adjusted on rests so that the mirage can be observed by the shooter before firing each shot. In using a telescope for this purpose, the firer will focus it on the target and then throw it slightly out of focus by lengthening it. The mirage can be seen to better advantage when the telescope is a little out of focus. Do not throw the telescope out of focus by shortening it, as that will cause the mirage to appear to be running in a contrary direction to its real course.

If the rifle, when not in use, is kept in an arms rack or other place where it is liable to become dusty, keep a gun cover on it for protection.

CHAPTER FOURTEEN.

Suggestions to Riflemen on the Target Range.

The greatest aid to good shooting is the use of extreme care with every shot fired. "Good enough" won't do. Unless the rifleman is able and willing to exercise the utmost care, he cannot expect satisfactory results.

Before commencing the day's firing, wipe out the barrel of the rifle, using patches saturated with gasoline, to remove all oil or powder solvent from the bore and chamber. If this is not done, the first few shots fired will be very apt to go wild.

Wipe the oil from the cocking piece and sear, as it interferes with a clean, even "squeeze."

Before going to the firing point, be sure that the blackening has not been rubbed from the sights, and look through the bore to see that there is no obstruction in it.

Take to the firing point enough cartridges for sighting shots and the complete score. Keep the cartridges out of the hot sun, and do not wet them.

When firing in the prone position, a comfortable placing of the elbows on the ground and care to secure a good steady position will tell in the score. Make a little hole in the ground for each elbow if possible; get close to the ground; spread the legs well apart, with feet turned down and not resting on the toes.

Do not adjust elevations for the open sight and then use the peep sight, or the reverse. This happens very frequently, especially when men use the open sight for some classes of fire and the peep sight for others.

Firing on the wrong target is a mistake quite often made and one which must be constantly guarded against.

An occasional miss may be avoided by always assuring oneself that the rear sight is correctly adjusted. At each shot during slow fire, before aiming, the rear sight should be looked at, to see that it is set for the proper elevation and windage. The jar to the rifle when fired often loosens the slide binding screw which holds the slide in place and the latter will slip down without being noticed and a miss will result. The taking of wind allow-

ance on the wrong side has been the cause of many a bad shot. At rapid fire the same precautions should be taken before the score is commenced.

Hold hard with the right hand. This is especially important when shooting off-hand. The rifleman should not let the use of the sling incline him to forget this hard holding with the right hand.

Press the jaw hard against the stock of the rifle; this will assist materially in the steadiness of the aim.

Hold firmly and evenly, always the same. Fire each shot as if life depended on it, and don't worry about past bad shots.

Harden the heart against a loose "let-off"; keep the eye open at the moment of firing, and don't "flinch."

Don't get careless with any shot. The sights and the bull's-eye must always appear the same. Never fire a shot at slow fire until perfectly sure that everything looks right.

Don't aim too long; take the rifle down from the shoulder and rest; a slight change in aim is not noticed quick enough by the eye if the aim is continued too long.

It is a great mistake to fire a shot when anything looks wrong. If there is any doubt as to whether the front sight is centered in the peep sight or as to whether the firer is seeing the accustomed amount of white underneath the bull's-eye, don't fire. Take the rifle down and make a fresh start. The eye may be tired and the bull's-eye become blurred—don't fire.

Take a last look at the flags or the mirage, to see if the wind has changed, and then get the shot off as quickly as is consistent with good, careful aiming.

On firing a shot, the rifleman should observe the aim at the moment the trigger was squeezed, continue the aim a moment after firing, call to himself where the shot is expected to hit, pull back the bolt, and watch the marking of the shot.

Open the bolt every time the gun is taken down from the shoulder. This avoids accidents, allows the rifle

to cool, and prevents accidental discharge due to the fact that the trigger has been partly squeezed.

When in the bull's-eye and a change of conditions occurs, don't be afraid to move the sight enough. Go boldly for every indicated change of weather conditions, making the correction before firing the shot.

Do not shift the point of aim. Change the rear sight to correct the position of the succeeding shot on the target whenever necessary.

Every shot steadily fired which is a miss shows where the target is not. More is learned from poor shots than from hits in the bull's-eye.

Keep the eyes off the target as much as possible and don't rub them.

Each man should stick to making his own score and not heed scores made by some one else. Try to beat the target, not some other man.

Determination—a steady, untiring, unflinching resolve that every shot shall be well fired—is the key-note to success.





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